



7-2



Digitized by the Internet Archive  
in 2011 with funding from  
LYRASIS Members and Sloan Foundation

<http://www.archive.org/details/lumberreports03snsI>







CONTENTS

Page

Logging and manufacture of longleaf pine,  
Brooks-Saulson Company, Monticello, Louisiana,  
by J. J. Fritz and J. E. Forsythe. 1

Report of investigation of the lumbering  
operations of the E. P. Burton Company,  
Berkeley County, South Carolina. 34

Report of lumber operation of the Santee  
River Cypress Lumber Company, Ferguson, South  
Carolina. by N. M. Goodyear and R. P. Hemingway. 110

Report on the lumber operations of the John L.  
Roper Lumber Company, by R. J. Shields and  
G. Macfarlane. 150



LOGGING AND MANUFACTURE OF LONGLEAF PINE.

BROOKS-SCANLON COMPANY.

KENTWOOD, LOUISIANA.

BY

J. J. FRITZ - and - J. P. FORSYTHE.



# LOGGING AND MANUFACTURE OF LONGLEAF PINE.

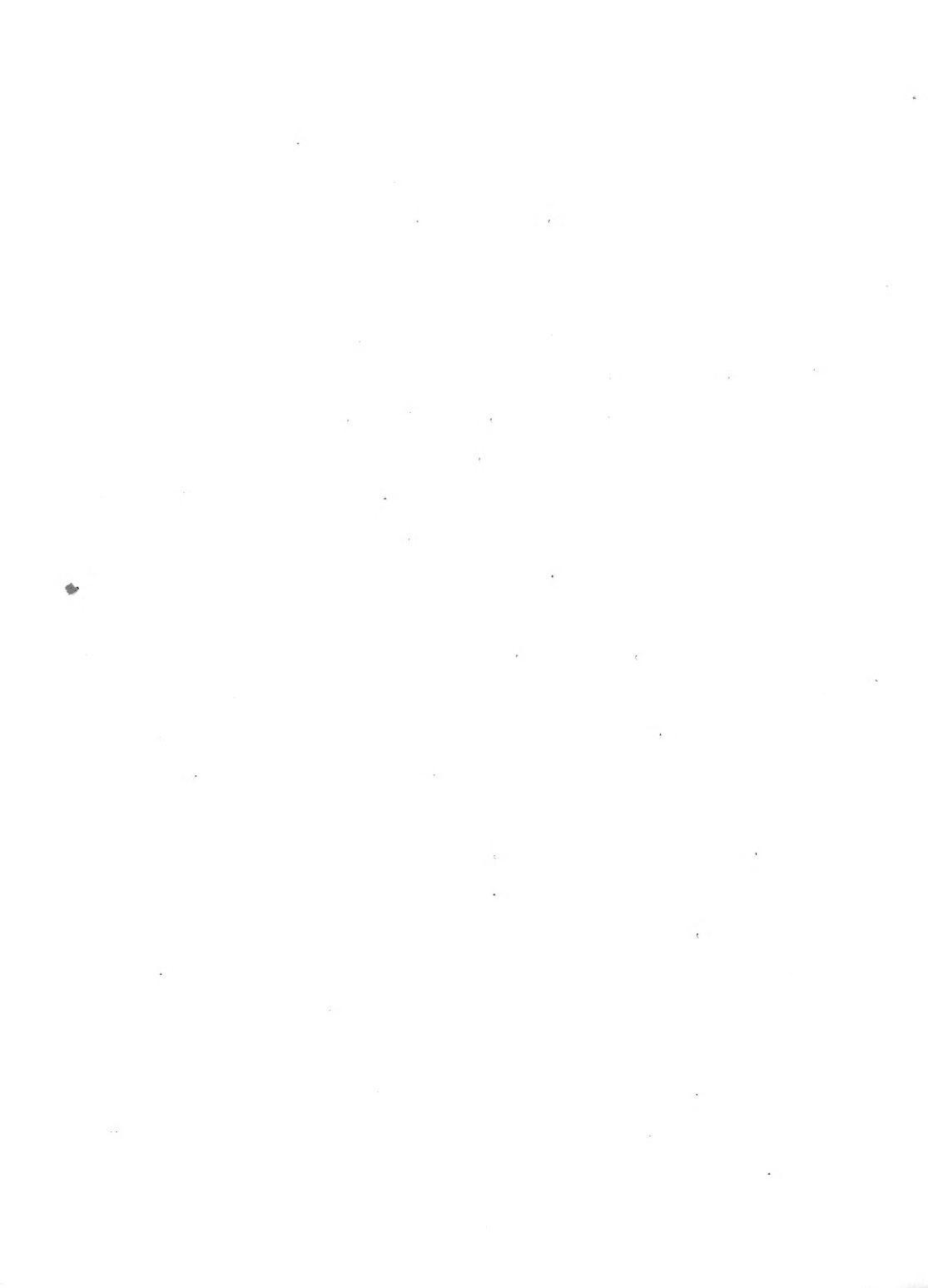
BROOKS-SCANLON CO  
KENTWOOD, LOUISIANA.

## -INTRODUCTION-

The Brooks-Scanlon Company, with headquarters at Kentwood, Louisiana, is one of the large lumber companies of the longleaf pine belt. Situated, as they are, on the main line of the Illinois Central Railroad, they occupy a central position in the lumber industry of this region. They have direct transportation facilities to New Orleans, the greatest shipping port in the southern country.

The holdings of the company comprise an area of approximately 50,000 acres. Besides the land they own they control the stumpage on a large amount of property held by settlers in this region. This area is cut up by small settlements, as is typical throughout the entire southern lumber regions. The entire tract lies in the rolling pine lands of the southern pine region. The hills form broad, gentle undulations rarely exceeding an elevation of 300 feet. Thus spreading out in extensive table-lands, these hills are covered exclusively with the forests of the longleaf pine for many miles without interruption. The monotony of the pine forest on these table-lands is unbroken except on the moister stream bottoms where some hardwoods predominate. The tract is on the water-shed of Big Creek and Chefunete River, which have for their reservoir Lake Pontchartrain.

In the days of pioneer settlers the entire state





of Louisiana was surveyed, under the direction of the United States Government, by the rectangular system. Much of the land now owned by Brooks-Scanlon Company was formerly held by settlers of small means. Before purchasing the land the timber was estimated by the company cruiser, who based the total estimate of the forest on the amount of standing timber on average forties. The timber was bought on strictly a stumpage basis, but in many cases it was easier to negotiate with the land owner by purchasing the entire stand by the acre. These purchased areas were all properly located on a map which had been prepared by the timber estimator. The boundaries of the tract are marked by blazes, all section corners being marked by two blazes, while straight lines, where obstructions enter, are marked by a single blaze.

The stand of the tract is a typical longleaf pine type. A few hardwood and some shortleaf pine trees occur on the moister situations but they are of minor importance. The maximum stand per acre is approximately 60,000 board feet, while the average is but 12,000. Situated, close to the Gulf Coast as this stand is, it has all climatic conditions peculiar to the southern pine region. High winds and small cyclones are quite frequent and they leave evidences of their presence in all sections of this region. One striking example of cyclones is visible at the present time. Two years ago a cyclone passed over the tract, leaving in its wake a strip of fallen timber one and one-half miles wide, and covering a total area of 8,000 acres. The damage was enormous, since the life of longleaf pine is short when brought in contact with the soil. Con-



trol of meteorological elements is above the power of humanity, but the ravages of fire, the greatest enemy of the forests, can be controlled by man. Brooks-Scanlon Company encourage fire protection by posting fire warnings in the vicinity of their camps and in other conspicuous places throughout the forest. To further enforce the policy of protection and to prevent trespass, one man is employed to continually patrol the tract. Since longleaf pine contains such a large percent of resin it is difficult to prevent fires in a type of this nature. The poor natural reproductive powers of longleaf pine, combined with frequent fires keep the forest floor void of all litter and young tree growth.

Brooks-Scanlon Company found that the most efficient method was to turn the entire woods operation over to a logging contractor. This system made it necessary for them to have but one competent man in the woods to look after their interests, while otherwise it would require an entire force of men under the direct supervision of the main office. The lumber company controls the Kentwood and Eastern Railroad and this line runs almost directly through their holdings. All rolling stock used by the logging contractor is furnished by the railroad company. However, the logging contractor does have an interest in all spurs and thus the loaded cars do not leave his supervision until they are delivered to the main line. The contractor receives \$3.00 per thousand F.O.B. for all the timber he handles. In the contract for logging no provisions are made for a second crop or for reproduction.

The system of cutting employed on this tract is primarily a clear cutting method. To prevent total loss of the



wind-thrown timber, previously mentioned, they have endeavored to log the damaged area before touching the uninjured portion of the stand. The only method of brush disposal in use at the present time is to burn over the logged area. Since reproduction is not encouraged and the logged-over land is better adapted for agricultural pursuits than for forestry purposes, it is put on the market as soon as all merchantable timber has been removed. At present an area of 10,000 acres is held for sale at the low price of \$10.00 per acre. Every effort is made to encourage the development of agriculture in this community.

The method of taxation in every community seems to be the one great factor that discourages the private and corporate owner from providing for a second crop of timber. The basis of taxation of timber lands is their productive capacity. The rates of taxation on all property in this section is at present fifteen mills on each dollar valuation. For the sake of simplicity in the taxation of forests they classify the stands according to their volume in board feet. Class "A", including land containing 14,000 feet or over are valued at \$24.00 per acre; class "B", 10,000 to 14,000 feet are valued at \$17.00 per acre; class "C", 6,000 to 10,000 feet are valued at \$12.00 per acre; and all cut-over land is valued at \$3.00 per acre. It can be seen from these figures that deforestation rather than afforestation is encouraged.



PLATE I.



Team used for swamping.



Negro gathering wood for the skidder.

.I ETAL-I

.gniquelwe rol beaw msel

.tebbina eit rol boow gnirentey orgel



-THE LOGGING OPERATION-

J.E.Hurd and Company, logging contractors for Brooks-Scanlon Lumber Company, have at the present time three camps located on different sections of the tract. These camps are always located in the most advantageous position for the lumber that is to be cut. The camps are located on different spurs of the logging railroads which traverse the entire cutting area. The group of camps have for their nucleus, Scanlon, a camp constructed on modern plans, with reference to comfortable homes for their employees and men in charge. Scanlon is the terminus of the Kentwood and Eastern Railroad, a state chartered corporation controlled by the Brooks-Scanlon Company, and is used chiefly for the transportation of their logs and employees. Scanlon is a complete modern logging camp consisting of, the headquarters of the contracting logging firm, homes for the office force, commissary, machine and blacksmith shop, recreation parlor for the employees, pump-house acting in the capacity of a source of supply of water for the entire logging operation, "mess-house" for the unmarried employees, and both stationary and portable homes for the laborers. The office of the contractor occupies a stationary frame building located in the center of the small lumbering camp or town. Besides the office proper there are sleeping rooms for the men in charge of the building.

The ox-camp, as it is called, is the next in importance. This camp is located on a new spur of track about five miles north-east of Scanlon. The camp consists entirely of portable houses, has a water supply of its own, blacksmith shop, and all other conveniences necessary for a temporary camp. The name



PLATE II.



The Clyde four-cable skidder in operation.



Side view of Clyde skidder.



originated from the fact that this is the headquarters of the skidding operation carried on by animals. About thirty men consisting of drivers, fellers, blacksmiths, swampers, and scalers are located at this place.

The skidders camp, the third and smallest, has derived its name from the occupation of the men. All the horses used in the steam skidding operation are kept here. Many of the men employed in the immediate vicinity reside at this camp. The camp, consisting of portable houses and horse stalls, is located on either side of the spur line of the railroad which runs through that section.

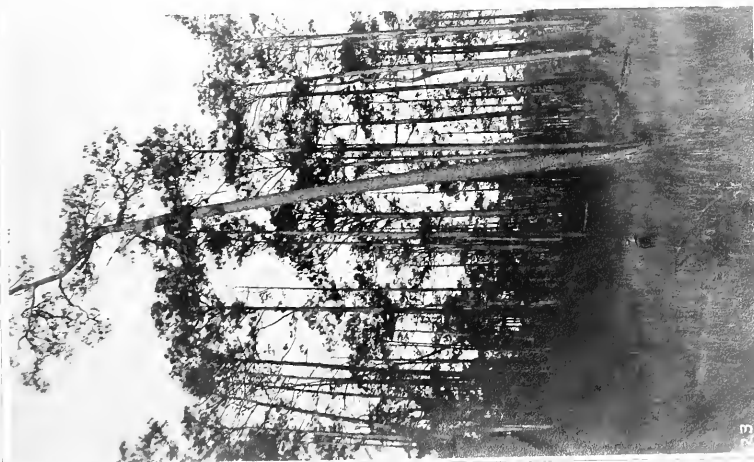
The southern country is not a typical lumber camp region since many of the employees are farmers or other property owners in the nearby vicinity. Only a small percentage of the laborers actually reside in the lumber camp and it is only these that are affected by the regulations common in all operations. Owing to the complications that arose by only a small number of the men boarding at the camp "mess-house", the contractor found it better to sub-let the boarding interests, but to insure protection for the sub-contractor all board is collected through the main office. The contractor withholds one-eighteenth of all board that is collected in order to defray the expense of the office force required to collect the money. Each employee is charged two percent of his net earnings for insurance and in case of accident he receives one-half pay during his period of incapability. A company doctor is employed and his salary is met by an assessment of fifty cents per month on all unmarried and one dollar and a half on all married men, in the employ of the company. His duty is to attend all patients in the camp, but he



PLATE III.



Repairing a broken cable.



Stand of longleaf pine.





is also permitted to attend serious calls from the residents of the neighborhood.

### Laying out and construction of railroads

Owing to the general topography of the country the laying out and building of the railroads is a very simple matter. The most elementary surveying suffices for the obtaining of the course and grades of the line. All branch or spur lines lead to the main<sup>line</sup> of the Kentwood and Eastern Railroad. The courses are laid out by representatives of the Brooks-Scanlon Company and a member of the logging firm. They make a superficial examination of the tract and locate the lines in order to make the easiest access to the stand of timber they desire to log. Great care is taken to keep the initial expense of the railroad at a minimum and to maintain this they avert all difficult grades and rugged topography, which can possibly be avoided. The grading crew follows the course, as has been previously laid out, and they prepare the road-bed for the reception of the ties. This grading costs approximately \$400.00 per mile. The tie and steel gang complete the building of the railroad track, their labor together with the cost of steel and other necessary construction material costs \$600.00 per mile, thus making the total cost for the entire construction of the logging spurs approximately \$1000.00 per mile. The cost of construction is borne by the logging firm, while Brooks-Scanlon Company furnish all the construction material. The spur lines although temporary must necessarily be of solid construction in order to withstand the great strain caused by the modern skidding and loading machinery used in the operation. To maintain a solid road-bed it is necessary to keep a



PLATE IV.



The McGiffert Loader in operation.



Chaining a loaded car.



"Track Maintenance Gang" of nine men working continuously on the logging spurs. The preservation of a good road-bed makes an additional expense of about six cents per thousand feet board measure on all the logs transported to the main line. The distance between the logging spurs varies according to the method of skidding used. In the case of steam skidders it is twice the width of the area covered by the skidder, on one side of the track and where animal skidding is used it is much wider than this. If the area is to be logged with the steam skidder, the track is generally located on the top of a ridge or on the highest ground, while the opposite is the case where animal skidding is employed.

#### Felling, skidding and loading

The methods of logging employed on this tract are in general the same as those used in all regions of this country, in that they include the general stages of felling, swamping, scaling, skidding, loading and transportation. Within these steps there are "tricks of the trade" and methods characteristic of the yellow pine region of the south and specifically of this tract.

The felling operation at each camp is carried out in a similiar manner, regardless of the way in which the logs are to be handled. The felling is all done by a crew of two men, using cross-cut saws and axes. The latter being used to notch and trim the tree, while the former is used in felling and cutting the tree into log lengths. All dead timber and live trees containing an eight foot log with a top diameter of eight inches or over are utilized, The heighth of stumps is limited to eighteen inches but lower stumps are recommended where the tree can be more economically used. No method of brush disposal is adhered to, except where



PLATE V.



Effect of wind and fire.



Young stand of longleaf pine.





more free access to the timber is essential. Two to three inches are allowed in excess of actual length on all logs from eight to twenty-four feet, while four to six inches are allowed on all logs over twenty-four feet in length. A felling crew of two men, to whom filed saws and wedges are provided, will cut, on an average, 8,200 feet board measure per day, at a cost of forty cents per thousand. Owing to the great amount of crude resinous substance in the longleaf pine, some preventitive means must be used to keep the saw from "pitching". On the particular tract studied the fellers kept with them a bottle filled with kerosene, which had a cork made of pine needles that allowed a fine spray of the oil to be scattered evenly over the saw. The oiling process was essential after nearly every cut and often a greater number of times during the felling of a large tree.

A well organized plan of keeping the scale of timber cut by each crew separate, and yet give each crew full credit for all the logs they cut was in use on this tract. One scaler was employed for each gang, the gang varying in size according to the method of skidding employed on the particular section. The duty of this scaler was to lay off uniform plots, generally thirty-five by two hundred and fifty yards, for each pair of sawyers or felling crew. Upon the completion of felling the timber on one of these areas the crew was assigned another portion, while the scaler gave them due credit for all the logs they had cut. Also in order to facilitate rapid progress in felling one saw-filer and one wedge-maker were assigned to each gang of felling crews. The duties of these men were to provide sharp saws and efficient wedges. These <sup>men</sup> were paid by the day, their



PLATE VI.



Burn and young growth of longleaf pine.



Logged over area and logging train.



wages being exclusive of the \$.40 per thousand received by the fellers. The timber in this way is fully prepared for the skidding by the various methods.

#### The skidding operations.

On the particular tract studied both the systems of steam skidding and skidding by animals were in use. Steam skidding was done by the Clyde Four-cable steam skidder and the Russell two-cable skidders. The animal power consisted of the use of both horses and oxen, the latter being used mostly for skidding, while the former were in use in connection with the swamping in preparation for the ox-wagons.

The steam skidding is not only the most modern but on this tract it is also the most economical from the stand-point of the logging contractor. The Clyde four-cable skidder is run with its own power to the point where it is to be used, the brakes are then set, and while the four corner guys are being secured to stumps or trees by the four inside tong-men, the horses are taking out the skidding tongs, and the machine is immediately in full operation. Thus actual skidding is commenced with practically no delay whatever. The skidding lines are drawn out by horses as in this way the tongs may be carried directly to the logs, thus obviating the labor and delay of carrying the tongs any distance by hand. All logs are hauled in at right angles to the track. The skidder is therefore moved to the point nearest to the logs, thus reducing the length of the haul to a minimum. Generally they skid to a distance of about 800 feet on both sides of the track. The machine is moved on an average of 100 feet along the track between set-ups. The skidder is operated continuously without



PLATE VII.



The American Loader in operation.



Team used for swamping.





regard to the supply of cars. This machine is capable of skidding on the average 100,000 feet board measure per day. The cost of running the Clyde four-cable skidder, for labor alone, is approximately \$30.00 per day. The maximum skidded in one day, during the month of November 1910, was 1884 logs making a total of 204,110 feet board measure, but under ordinary conditions it averages 100,000 feet per day. Since in this particular region the only source of water is by pumping from wells, the skidder receives this supply from the pump at the main camp and it is delivered in portable storage tanks, by the logging train. In order to provide a constant supply of fuel, which is obtained from tops and other waste, two negroes with axes and a one-horse cart are employed and they usually keep about two piles of wood ahead of the skidder. Eight two-men felling crews are required to provide a constant supply of logs. To insure against any delay of the skidder which might be caused by unfavorable felling conditions the felling gang is supposed to keep approximately one month in advance of the skidding operation. To facilitate free piling of the logs, in preparation for the loaders, two men and one team are engaged in swamping and clearing a strip 50 feet wide on either side of the track. The cost of running the skidder including fuel, labor, swamping, supply of water and incidentals will average \$.64 per thousand feet for timber handled.

The operation of the Russell two-cable skidder is similar to that of the Clyde four-cable skidder and the cost per thousand is approximately the same.

The public sentiment in every community must be considered in all industrial lines, and often the sentimental point of view will over-rule the economical side of the proposition in question. The history of ox-skidding dates back to





Negroes felling a tree.



American Loader and section of loaded cars.



primeval lumbering and it can be traced through all regions of the country up to the present day. The replacement of animal power by the more modern steam power can be brought about only through gradual changes and we might say only through the passing of the industry into the hands of the coming generations. It has been conclusively proven that steam skidding is more economical from the point of dollars and cents, but to work in harmony with the surrounding settlers, who were instrumental in the building up of the country, the very interesting and antique method of ox-skidding must be employed to a limited extent. Even though the use of animal power in logging operation was the first method resorted to we find a steady evolution and today we find large teams of oxen hauling modern wagons in the place of the long chains of logs that were hauled in the early history of the lumber industry. A three-yoke team of oxen will skid on an average 12,000 feet board measure per day at an average cost of \$1.24 per thousand. This method of skidding requires a greater amount of swamping than the more modern method of steam skidding, and thus part of the extra expense is accounted for in this way. Since the history of ox-skidding is so old and familiar to all followers of the lumber industry a detail discussion of the operation is not deemed necessary in a report of this nature.

#### Loading operations.

The method of loading in vogue at the present time is strictly a steam operation. The J.E.Hurd logging company operated three steam loaders on the particular tract studied, a McGiffert type of the Clyde loader following the Clyde skidder, and two American loaders following the Russell skidder and the





Oxen used in skidding operation.



Horses used in skidding operation.





ox-teams. The capacity of the two different types is approximately the same, but the apparent advantage of the McGiffert loaders over the American type lies in the fact that the former "spotted" its own cars and had its own locomotive power while the latter must have the cars "spotted" by the logging engine in attendance. In order to explain fully the operation of the loaders a separate paragraph will be devoted to each type.

The McGiffert loader is a strictly self-contained piece of machinery having a boom, boiler, and engine placed on a truck supported by two standards or legs spaced sufficiently far apart to permit the empty cars to pass between them and underneath them. These standards rest upon the ends of the ties. For locomotion and transportation of the machine a set of wheels are provided which can be drawn up beneath the platform when the loader is in use. The machine is first set in position to load the logs, the trucks are lifted so as to permit a clear passage beneath the derrick frame, The train of empties is then run through the loader by the road engine and passed to the rear of the machine. The car or cars to be loaded are uncoupled and placed by the "spotting" line. One engineer, one fireman, one hookman, and two tongman are usually employed in the operation of this machine. Under normal conditions, in the longleaf pine region, the McGiffert loader will handle on an average 90,000 feet board measure per day at a cost of \$.42 per thousand.

The American loader, built by the American Hoist and Derrick Company of St. Paul, Minnesota, is a portable machine run upon a temporary track placed on top of the cars to be loaded. A platform which contains the boilers, engine and boom can be moved through a complete circle, with the truck as a center or





Front view of office at Scanlon.



Rear view of office at Scanlon



foundation. The machine is self-propelling but the cars it loads and upon which it moves must be placed by the road engine. Its chief advantage is that it can handle logs that lie at either end and at some distance from the car. One fireman, one engineer, one deckman and two tongman are required for the operation of this machine, and in addition the regular train crew of the attending train must be present. The machine has a daily capacity of 85,000 feet board measure and is operated at an average cost of \$.45 per thousand.

The logs are all scaled just before they are loaded and thus an accurate daily report of the number of logs and total volume is kept. One scaler attends each loading operation. As the cars are loaded they are collected by the yarding engine and delivered to the main line of the Kentwood and Eastern Railroad.





Section of log pond at Kentwood, Louisiana.



Sorting table of the Banner Mill.





-THE MANUFACTURING OPERATIONS-

The logs are delivered to the main line of the Kentwood and Eastern Railroad by J.E.Hurd logging company, and from that point they come under the direct supervision of Brooks-Scanlon Lumber Company. The destination of the log trains that are brought in on the Kentwood and Eastern Railroad is the mill-pond which is situated at the north-west end of the area occupied by the manufacturing plant. The pond is of a crescent shape, varies in depth from two feet to thirty feet, and is divided into compartments by a boom of logs for the purpose of keeping the supplies of the two mills separated. About three-fourths of the distance around the pond is banked up and un-loading skidways are built from this bank into the edge of the water in order that the logs may roll directly from the cars into the pond. In maintaining the sidings around the pond the outside rail is always raised, thus facilitating the unloading of the cars. After the log-train has been switched in on the siding, two men are engaged to unload the cars of logs. Since the logs are rolled directly into the log-pond, the unloading process is very simple. The top logs are rolled off by means of cant-hocks, the chains loosened and the remainder are removed in a similar manner. After they have reached the water they can be transported easily from place to place. Owing to the resinous contents a certain percent of the logs are heavier than the water and they sink to the bottom of the pond. In order to prevent loss that would be incurred if these logs were not utilized, men are employed to go about in pond-boats and pick up, by means of grappling-irons and windlasses, the sunken logs. These logs are transported to the mouth of the log-jack and they are held at the surface of the





Shed at discharging end of kiln.



Method of stacking lumber in yard.



water until they can be transported to the log deck in the mill. The entire process of unloading, lifting sunken logs and poling logs to the log slips is manipulated at a cost of \$.14 per thousand feet. The pond process is precisely the same for both mills, the only difference being the number of men required to supply the logs.

In order to explain fully the differences in construction and operation of the two mills a separate paragraph will be devoted to each. The Banner or larger mill has been in operation for about six years, while the Diamond mill has been used for approximately twenty-two years.

The construction of the Banner mill is modern in every respect. This is a double-band mill with a daily capacity of 250,000 board feet. The mill is of solid frame construction and the exterior is completely covered with sheet-iron roofing, thus making it less susceptible to fire that would originate from the exterior of the building. The building is divided into three stories. The top story contains the sawing floor proper, consisting of band saws, gang saws, edgers, trimmers, live-rolls and conveyors. The middle floor is occupied by the shaftings and conveyors which are used in the operation of the machinery, while the ground floor contains the foundation, steam-pipes from the power house and other stationary equipment necessary for the development of power. The saw-filing room might be classed as a fourth story, as it occupies a small portion of the space above the band-saw. On the west side of the main building there is a wing that is properly equipped for the manufacture of lath and staves.

The Diamond Mill is the smaller of the two and is located at the extreme south end of the mill pond. Since this





Scene in the lumber yard.



Section of dry shed, with water tank in the rear





mill was built about twenty years ago its equipment is not nearly so modern as that of its younger ally. The upper story contains the sawing machinery proper, the lath and stave rooms and the saw-filing room, while beneath is found the machinery necessary for the operation of the plant. The carriage in this mill is run by wire cables. All structural timbers and cants are squared by a band saw. The cants are converted into dimension material by a circular saw, and the process from this point is very similar to that of the larger mill. A battery of two dry kilns is required to quickly season the better grades of lumber from this plant. All finished lumber is transferred to the planing mill or main yard, over an elevated tramway. The Banner Mill being much more modern in every respect, its construction and operation will be taken as typical of the entire plant.

#### Operation of the Banner Mill.

The logs are transported from the pond to the log deck by means of the log jack. The log jack is an inclined trough, having an endless chain that contains strong uprights at intervals of about every ten feet, running through the depression in its center. The trestle is of a solid frame construction and is firmly fastened to the end of the mill. The endless chain is controlled by a man on the log deck, who by the manipulation of levers cuts the logs to the desired length and also supplies evenly the decks for the two band saws. All logs are scaled as they pass up the log jack and an accurate check is thus made on the woods operation. The cut-off saw is a large circular saw mounted on a swinging beam and it can be raised or lowered by the steam power of the machinery beneath. Steam "bumpers" are used





Animal power and manufacturing plant.



Loaded "dollies" on road to planing mill.



to eject the logs from the trough and the log decks proper are inclined at an angle of about four degrees, in order that the timber may roll unaided toward the carriage. Steam "knees", controlled by the sawyer, are at the end of the deck and these are used to hold the logs in check until they are needed. After the logs have been allowed to roll on the carriage the sawyer operates steam "niggers" which are used to place it in the desired position. The services of three men are required to properly operate the log carriage, that is to set the "dogs" and manipulate the set works. The carriage is run back and forth by means of a steam piston which is much more efficient than the old cable form of drive. The most responsible position in the manufacture of lumber is that held by the sawyer, who not only controls complex machinery by the manipulation of mechanical appliances, but his judgement is also directly responsible for a complete utilization of the product. He must size up the log and almost instantaneously decide what material can be gotten from it. The carriage passes with lightning speed and the removed slabs or boards are placed on live rolls, which are controlled by men who by means of steam "kickers" transfer it to the machinery that it must pass through before it takes the form of the finished product. The slabs pass directly to the slicer and most of the other material is transported to the edges. Timber of a suitable nature is cut into cants and a swinging crane is used to place these on live rolls that lead to the gang saw. All material going through the gang saws is moved to the edger and the boards cut in such a way as to get the highest grade and the greatest amount of lumber out of them. After leaving the edger the refuse is separated from





Section of dry shed. Shows system of fire protection.



View of planing mill.





the merchantable material, the former being transferred to conveyors which take it through the slasher, while the latter passes through the trimmer, enroute to the sorting table. Large structural timbers pass directly from the band saw through the mill to a dresser which prepares them for immediate shipment.

All slabs, edgings and dust from the saw-mill are transferred to the west wing of the building. All the slabs and edgings that contain enough material for a lath are sorted out, while, after sufficient amount for fuel has been transferred to the "hog," the remainder passes to the burner. The sorted material is first cut into lath lengths. The lath bolts are now passed through the small vertical saw, and after sorting they are tied in bundles of the proper size and transported to the dry kiln yard. Brooks-Scanlon Company do not have direct charge of the manufacturing of the lath but they give the work all out to contractors. The contractor receives \$.55 per thousand for all the lath cut and it costs the lumber company about \$.13 for repairs and upkeep of the plant, thus making a total cost of \$.68 per thousand for the manufacture of the lath. Some of the waste is also utilized in the manufacture of staves for resin barrels and short boards are used in making grain doors. Complete utilization of all forms of waste is encouraged in every department of the manufacturing plant.

The boards from the trimmer are lowered to the sorting table. This table is of solid frame construction and is equipped with endless chain conveyors which are run by power generated from the main plant. As the boards come from the trimmer they are marked by the grader and each grade is taken off at its proper place, by men who are stationed at the different





Log entering the power mill.



Timber Jack and Water Tank.



grade stacks. All grades No. 2 Common and better are taken off on the side toward the kilns. The other grades are taken off on the opposite side and placed on "dollies" on which they are later transported over the elevated tramways to the yard. After the "dollies" have been loaded with their respective grades they are hauled to the yard and the timber is stacked on the corresponding grade piles. The timber is allowed to remain in the yard until thoroughly seasoned, six months being the minimum time limit for air-drying. Before tracing the lumber from the sorting table through the kiln, it is deemed necessary to explain fully the theory and construction of the dry kiln.

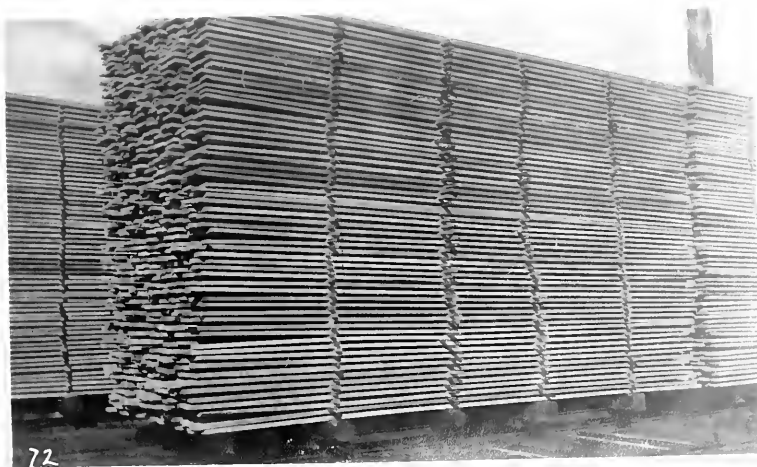
### The Dry Kiln.

The kilns used on this operation were built by the Standard Dry Kiln Company. All the walls, both exterior and interior, were constructed of brick, while the doors and frame of the roof were built from thoroughly dried, air-tight boards. The roof was covered with a standard patent paper roofing. The kiln through which the lumber from the Banner Mills passed had ten compartments with two tracks in each. The tracks were five feet gauge and the intervening distance was also five feet, while the distance between the outside rail and the wall of the compartment was two and one-half feet. A gentle slope is maintained from entrance to exit in order to facilitate easy movement of the loaded trucks. The doors are handled by the Standard Dry Kiln door carrier, the most up-to-date appliance of this nature. One door carrier at each end of the battery of kilns opens and closes all the doors. It slides on a track from door to door. A single track is employed at each end of the kiln, or battery of kilns, and this track is an ordinary railroad rail securely anchored to the building at a distance of six inches. The carrier is e





It is ready to enter the dry kiln.



lumber ready to enter dry kiln.





is entirely detached from the doors when not in use. To open the door it is rolled along the track and brought opposite the door. Then by merely throwing a lever the door is raised and moved outward and is ready to roll in either direction away from the doorway. The source of the steam used for heating, and the uniform pressure necessary, is controlled in the boiler room of the power house.

On entering the kiln, the green material is enveloped by a body of evenly heated moist air. The humidity of the air at the receiving end of the kiln prevents baking, warping, or case-hardening, keeps the surface soft and opens the pores through which the heat penetrates to the heart of each piece of stock, starting the sap from the center, which is the logical and ideal method of drying. After sufficient period of the treatment, the car is advanced one stage toward the discharging end of the kiln. As the car progresses stage by stage through the kiln, the moisture is gradually extracted from the material. Nearing the discharging, there being little moisture left in the stock, the humidity of the air is relatively less and the temperature proportionately higher. The drying is completed at the extreme discharging end in a high and dry atmosphere. Once the kiln is filled with cars of material, the process of operation is simple and continuous. Outlets for the moist air, that accumulates in the kiln, are provided in the form of two horizontal flues which extend along the side walls for a certain distance from the front end. The relative humidity is secured by opening or closing the flues. The cold air is admitted through the air-shaft, which is located below the steam-pipes, from the discharging end to the center of the kiln. The top is perforated and through these openings the cold air is brought into contact with the heating surface.





Side of the building, Sullivan.



Section of log pond and view of burner.



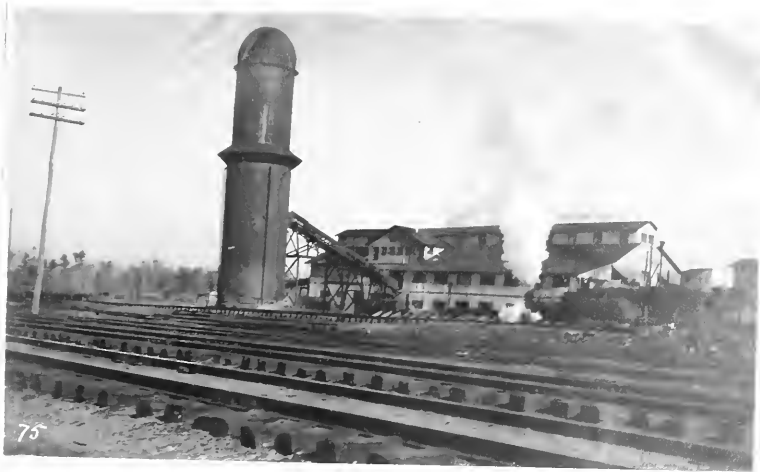
Kiln drying longleaf pine by this process requires a uniform temperature of 210 degrees Fahrenheit for an approximate period of seventy hours. To advantageously operate the battery of ten compartments a force of six men is required. Each compartment will hold approximately 60,000 board feet, stacked on trucks with a capacity of 3,000 board feet each. The cost of handling the lumber, charging the kilns and supervision is approximately \$.60 per thousand.

The boards after passing through the dry kiln are placed on a conveyor and regraded. All lumber after being kiln dried is either shipped directly, stacked in the dry sheds, or transferred to the planing mill. The dry sheds are of open frame construction and intersecting elevated tramways divide them into compartments. The lumber taken to the sheds is stacked in closed crib and remains until it can be used in the planing mill or is needed to fill orders.

#### The Planing Mill.

The planing mill is a complete industry in itself, having as its source of raw material, the seasoned lumber from the yard and the kilns used in connection with both mills. The power plant occupies a brick building, while for convenience an open frame shed is used to protect the wood-working machinery. All the lumber is handled by experienced men and the highest possible grade is obtained in every case. The better grades are all taken to the planing mill and converted into siding, flooring, ceiling, pickets and finishing lumber of all descriptions. The seasoned lumber is brought into the planing shed on "dollies" and delivered to the machine turning out the product for which the lumber is adapted. It requires but one man to feed each machine. The finished product is discharged from the machine onto an endless chain conveyor running on an elevated platform or sorting





View of the Banner Mill.



Boarding-house for the employes.





table. The lumber is marked according to its grade and men stationed on either side of the conveyor place the grades on their respective stacks. The lumber that is to be shipped is taken directly to the cars while the remainder is stacked in the dressed lumber shed. The cost of planing mill labor is \$.53 per thousand board feet. Transferring the lumber from the planing mill and loading the same on cars makes an additional expense of \$.56 per thousand. Thus the total expense of dressing and shipping the lumber is \$1.09 per thousand board feet.





Entrance to the Banner Mill.



Familiar scene at the ox-camp.



FORMS USED BY THE BROOKS-SCANLON COMPANY.



# BROOKS-SCANLON COMPANY.

## SCALER'S DAILY REPORT.

CAMP,

DATE.

Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet
Des.	Sec.	T.	R.	Cars	Logs	Feet

Total  
No. Cars

Total  
No. Logs

Total  
No. Feet

Loaded by Loader No.

Any Delays?

Time Delayed

Cause of Delay

Any fire in Logs today?

Cause of fire

Was any effort made to put fire out?

Remarks

R

Signed

Scaler.





# BROOKS-SCANLON COMPANY

MANUFACTURERS OF

LONG LEAF YELLOW PINE LUMBER

Kentwood, La., \_\_\_\_\_

## Daily Report of Logs Loaded in Woods.

LOADERS AND SKIDDER	CARS	NO. PIECES	NO. FEET	DELAYS
American No. 1				
" No. 2				
McGiffert No. 1				
" No. 2				
Skidder				
Total Stand. Gauge				
Total Narr. Gauge				
GRAND TOTAL				

## Cut in Saw Mill.

MILLS	NO. PIECES	NO. FEET	DELAYS
Diamond Day - - -			
" Night - - -			
Banner Day - - -			
" Night - - -			
TOTAL			

Scale in Woods this Month \_\_\_\_\_ Pieces \_\_\_\_\_ Feet

Scale in Mills this Month \_\_\_\_\_ Pieces \_\_\_\_\_ Feet

Remarks \_\_\_\_\_

BROOKS-SCANLON CO.

By \_\_\_\_\_



Show this  
Order Number  
on your Invoice

J. E. HURD AND COMPANY  
Loggers for Brooks-Scanlon Co.

Order No.

Scanlon, La.,

Ship to

at

via

Price

State terms plainly on Invoice.

Please acknowledge receipt of this order.



# J. E. Hurd and Company

## Loggers

For Brooks-Scaulon Co.

J. E. Hurd  
General Manager.

Scaulon, La.,



# TIME CHECK

For ..... 19 .....

	RATE	DR.		CR.	
Days.....					
Hours .....					
Logs.....					
Cash.....					
Checks .....					
Board .....					
Rent.....					
Accident.....					
Doctor .....					
.....					
Balance Due .....					

C. H. Stevens Logging Company.





# DAILY SAW REPORT.

191

	NAMES.	Logs.	Feet.
Saw 1			
Saw 2			
Saw 3			
Saw 4			
Saw 5			
Saw 6			
Saw 7			
Saw 8			
Saw 9			
Saw 10			

Checker.



# BROOKS-SCANLON CO.

## DAILY SAW MILL REPORT.

Kentwood, La.,

191

	FEET.
4 and 6 inch No 2 and Bet. Strips .....	
8 inch and wider No. 2 and Bet. Boards .....	
1 $\frac{1}{4}$ and 1 $\frac{1}{2}$ inch x 4 and wider No. 1 and Bet. ....	
2x4 and wider No. 1 and Bet. ....	
4 inch and wider No. 4 Boards .....	
12 inch No. 2 Com. Boards .....	
4 inch and wider No. 3 Com. Boards .....	
Dimension No. 1 and 2 .....	
Dimension No. 3 .....	
Timbers and Bill Stuff .....	
.....	
.....	
Total Cut Lumber .....	
Total Lath M'f'd .....	
Total Lath Scaled .....	
Total Cut Staves .....	
Total Cut Box Boards .....	
Delivered to Yard .....	
Delivered to Kilns .....	
Dock Shipment .....	
Total .....	

Log Scale Pcs. .... Feet .....

Remarks .....

.....

.....



REPORT OF  
INVESTIGATION OF THE  
LUMBERING OPERATIONS OF THE  
E. P. BURTON COMPANY,  
BERKELEY COUNTY,  
SOUTH CAROLINA.

Made by-

during January 1909.

1000

1000

1000

1000

1000

1000

1000









--O-- "CAPTAIN OSCAR." --O--





MR. F. LUDFORD, WOODS SUPERINTENDENT,  
--O--ON THE RIGHT, AND MR. BURCH, GENERAL --O--  
MANAGER.



THE GENERAL FOREST REGION.

The timberlands of the E. P. Burton Lumber Company, are situated in Berkley County, South Carolina, between the Cooper and Santee Rivers, thirty miles from Charleston by river, and thirty six miles by road, is made up of holdings varying in size from six hundred to twenty thousand acres each, and consist in all of about forty five thousand acres not cut over. You will notice this figure corresponds with the government bulletin. This should not be misconstrued. The company has acquired since that time, amounts of timber land which, it is estimated, are equivalent to the land cut over up to the present time, thus making the amount of uncut land the same as when the report was made. Five thousand two hundred acres are cultivated and waste lands, and ten thousand acres, of which only the stumpage is owned. Except for a few adverse holdings consisting of a few small lots of from ten to one hundred acres each, the tract forms one solid block.

The region is low, flat, and only slightly higher than the level of the sea. There are numerous swamps and savannahs, and sandy soil is characteristic. Further from the river the topography is more or less rolling. The drainage is into the east branch of the Cooper River which has its headwaters in the Turkey and Nicholson runs, which in turn drain the numerous swamps and low lands. Owing to the past treatment of the lands, many roads traverse the tract in all directions, which in dry weather are fair, and in wet weather almost useless for lumbering. The logging is entirely done by rail and steam. Parts of the tract are subject to overflow. Past treatment of the many private holdings into which the original forest was divided, has influenced



largely the character of the present stand.

The influences to which the present character of the forest is due, are turpentine gathering, fire, agriculture, and lumbering. The resultant forest is quite diversified depending upon these conditions. Lumbering had been carried on in a very limited way for many years; the operations were only for local needs and were on the selective system, only the most desirable trees being taken. However, for the past ten years, or since the consolidation of the numerous tracts into one larger holding, lumbering has been more extensively, economically, and systematically carried on.

Broadly speaking, the lands can be divided, from a commercial standpoint, into three types in order of importance, Loblolly pine land one third area, Longleaf pine land one third area, and Swanpland one third area in which gums, Cypress, and various other hardwoods predominate.

Further inland from the river the topography becomes rolling and is typical of the land forming the South Atlantic Coast Plain in South Carolina.

#### THE FOREST DESCRIBED

The forest in this particular region when contrasted with the Northern forest presents very characteristic differences. Instead of the heavy stands with a thick growth of underbrush and a thick soil covering, we find the principal species in virgin stands occurring in more or less isolated groups of very small density and thriving well on very shallow soil.

Low, flat, slightly rolling topography is the general rule.





The maximum stands on the tract run from 10,000 B.M. to 15,000 B.M. per acre, but form only a very small percentage of the whole area. The average stand is about 5000 B.M. per acre.

# TREES ON THE COOPER RIVER HOLDINGS

(Taken from Gov. Bull. #56, Bureau of Forestry, P46.)

Common name	Botanical name
Loblolly pine	<i>Pinus taeda</i>
Pond pine	<i>Pinus serotina</i>
Shortleaf pine	<i>Pinus echinata</i> Mill
Spruce pine	<i>Pinus glabra</i> Walt.
Longleaf pine	<i>Pinus palustris</i> Mill
Bald cypress	<i>Taxodium distichum</i> (Linn.) Rich
White cedar	<i>Chamaecyparis thyoides</i> (L.) B.S.P.
Red cedar	<i>Juniperus virginiana</i> Linn
Bitternut hickory	<i>Hicoria minima</i> (Marsh.) Britton
Shagbark hickory	<i>Hicoria ovata</i> (Mill.) Britton
Mockernut hickory	<i>Hickoria alba</i> (Linn.) Britton
Pignut hickory	<i>Hickoria glabra</i> (Mill.) Britton
Swamp cottonwood	<i>Populus heterophylla</i> Linn
Hornbeam	<i>Ostrya virginiana</i> (Mill.) Koch
Blue beech	<i>Carpinus caroliniana</i> Walt.
Beech	<i>Fagus atropunicea</i> (Marsh.) Sudworth
White oak	<i>Quercus alba</i> Linn
Post oak	<i>Quercus minor</i> (Marsh.) Sargent
Live oak	<i>Quercus virginiana</i> Mill



Black oak	<i>Quercus verlutina</i> Lam.
Spanish oak	<i>Quercus digitata</i> (Marsh) Sudworth
Blackjack oak	<i>Quercus marilandica</i> Muenchh
Water oak	<i>Quercus nigra</i> Linn
White elm	<i>Ulmus americana</i>
Winged elm	<i>Ulmus alata</i>
Hackberry	<i>Celtis mississippiensis</i>
Red mulberry	<i>Morus rubra</i>
Yellow poplar	<i>Liriodendron tulipifera</i>
Red gum	<i>Liquidambar styraciflua</i>
Red maple	<i>Acer rubrum</i>
Dogwood	<i>Cornus florida</i>
Black gum	<i>Nyssa sylvatica</i>
Persimmon	<i>Diospyros virginiana</i>
White ash	<i>Fraxinus americana</i>

#### TREES AND SHRUBS FORMING UNDERBRUSH

Titi	<i>Cliftonia monophylla</i>
Gallberry (inkberry)	<i>Ilex glabra</i> (Linn.)
Green brier	<i>Smilax laurifolia</i>
Devilwood	<i>Osmanthus americanus</i>
Sweet magnolia (white bay)	<i>Magnolia glauca</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Red bay	<i>Persea borbonia</i>
Rattan	<i>Bignonia caprealata</i>
Hurrah brush	<i>Andromeda floribunda</i>
Wax myrtle	<i>Myrica cerifera</i>



American Holly.

*Ilex opaca*

Yaupon

*Ilex vomitoria*

Purple Buckeye

*Aesculus Octandra*

Prickly Ash

*Xanthoxylum clava-herculis.*



## PAST FORESTRY

In 1903 the Government made a working plan for the Cooper River holdings of the E. P. Burton Lumber Company and published the results of the investigations as Bulletin 56, Bureau of Forestry. The objects were to estimate the amount of timber standing on the tract, to determine the acreage necessary to obtain a given annual sustained yield, and the necessary methods to be employed to obtain these results in the largest possible successive crops in the least time at the least expense.

Surveys of the whole tract with regard to the topographical division of the lands into types (Loblolly Pine Land, Long Leaf Pine Land and Swamp Land), and with regard to the old division surveys of the individual holdings, which go to make up the whole tract were made as well as valuation surveys (strip method) on average holdings throughout. The results thus obtained were made up in the form of volume, age, height and yield tables, from which estimates of the different species of the standing timber in the holdings in the whole and in part were made, with especial reference to probable future yield for twenty, thirty and forty year periods between cuttings. Silvicultural studies in respect to tree growth of the different species on the different soil formations were made, some little time being given to injury done to the tract through fire, insects, the present and past methods of lumbering, turpentineing, etc., etc.





In conclusion suggestions and recommendations for future management of the tract were made covering the following points:

(1) Supervision and Protection.

It strongly advised the employment of a forester whose duties should be to mark trees for removal, to organize a systematic fire patrol. to carefully study present logging methods with the object in view of eliminating present waste so evident in the system of lumbering, to so arrange the cutting as to allow the more thrifty growing stands to put on more growth by the removal of the more mature timber first, and to estimate the timber which is constantly under consideration for purchase.

(2) Rules for Lumbering.

Under this was advised

(1) the marking of all trees for removal and the establishment of a diameter limit (14" B.H.) and height of stumps (18");

(2) the use of hardwoods not otherwise valuable for curduroy instead of young pine. If necessary to use pine it should be cut from thickets and not from scattered individuals

(3) the use of culls, tops of felled trees, and hardwoods for firing purposes and not young pine;

(4) to use all possible care in skidding not to injure young standing trees;

(5) the removal of hardwoods wherever necessary.

In final conclusion it was stated that conservative



treatment of the timberlands of the E. P. Burton Lumber Company was practical because of two reasons, that such a treatment would greatly increase the yield of timber on the tract and would make a permanent investment out of what is now only a temporary one.

At the suggestion of the Government Bureau of Forestry the E. P. Burton Lumber Company employed a forester for about three years. Mainly the work of the forester was to caliper and mark all trees for felling, with the object in view of leaving seed trees, establish fire lines and to keep out fires from the whole tract. The forester had about three men constantly under him.

Fire lines running for about four miles from Confer to the river 100' on each side of the railroad track and about 6' wide were made and kept constantly clear of debris and grass. The results obtained from these fire lines were very encouraging, the fires running across the line being few. A great many of the seed trees left standing for reproduction have been blown down. The shallow root system formed by trees grown in dense stand cannot withstand individually the effects of wind when suddenly left to combat the elements alone. Fire control for the several years only made fires when they did come more intensive, hence more destructive, proving conclusively that fires must either be absolutely controlled or allowed to burn over the tract each year. The protection from fire for a short period causes the accumulation of grass and undergrowth, and when fire does come it destroys all young growth with it, as well as seriously injuring the more mature trees.



## FORESTRY AT PRESENT

No attention whatever is at present paid to forestry. The only object in view in lumbering is to get the greatest amount of timber at the least possible expense. Fires are allowed to run over the tract at will,--the only protection being the burning of the grass and underbrush immediately around the town and the building of the company once or twice a year. The company is thoroughly interested in forestry, however, and apparently is only too willing to co-operate with any successful and practical plan for forest management.

## HISTORY OF LUMBERING IN THIS REGION

The history of the lumber industry in this region has been very variable on account of the individual ownership and operation of the many small tracts in the past. The only portion of the tract lumbered has been the Longleaf Pine lands cut over some fifteen to twenty years ago. The resulting forest is quite a thrifty stand of Longleaf Pine in its various stages of development. The selective system of cutting had been practiced almost entirely before acquisition by the present management; the largest and best trees of the Longleaf Pine were taken almost entirely on account of low timber values and poor transportation, which made the smaller and less valuable timber unprofitable. On the greater portion of the tract, however, there has been little, if any, lumbering done before the present management took hold. The effects of fire, turpentine, grazing are very noticeable throughout. The company for four or five years back lumbered quite extensively in this



region by use of horses and mules. The old stables not used at present were arranged in an extremely handy and practical manner. The barns are of sufficient size to house thirty animals and are arranged so as to form three sides of a hollow square, the feed sheds forming the fourth side and facing the main railroad. The central portion about 40' x 80' is the barn yard. Two sides of the square thus formed is further enclosed by a wire fence making a cattle yard of over twice the size of the barn yard. Water for the barns is supplied by the town supply tank through pipes which in turn are connected to troughs. A straight track runs from the feed sheds to the main track about fifty feet away and enables the use of a small flat truck or car for hauling feed from the railroad to the barns. See Plate.

Past lumbering in many places throughout the tract has been very wasteful. In one place not over a mile and a half from Confer, one manager a few years ago left a million and a half feet of logs already felled in the woods because of carelessness mostly. Until recently many logs were allowed to go to waste in the operation because of their distance away from the skidder and loader and various other causes. This waste is now practically eliminated. None of the hardwoods, except Yellow Poplar, are cut. The principal cut is divided between Loblolly Pine, Cypress and some little Longleaf.

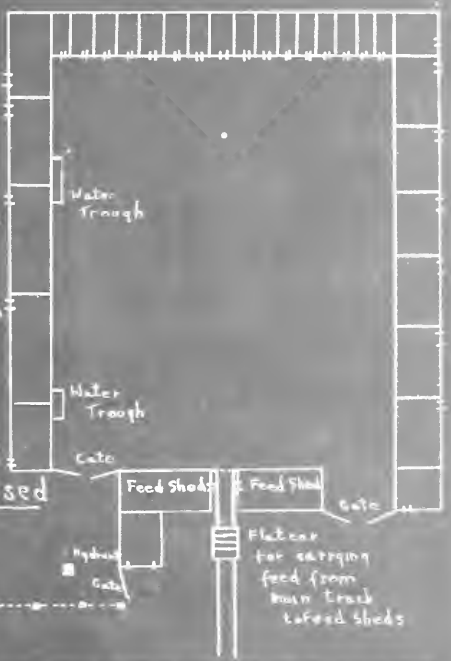
The company tried at one time the use of a portable gasoline engine for carrying back the cable to the woods. This method required almost a right of way crew to brush out for the portage of the gasoline engine and the use of a couple of mules to pull the engine to the various places.





Arrangement of Barns  
E.P. Burton Lumber Co  
Charleston S.C.  
Scale 1" = 40'

5' White Fence  
Stall divisions  
slatted up not tight  
and from 4' to  
top of roof  
Outside slatted  
2" Plank Floors  
2x6 Rafters  
Rough board  
shed roof with  
tar paper, water  
drained to outside  
Feed houses  
1 1/2 stories  
tight construction  
and battened  
Used formerly  
in Mule logging  
only partially used  
at present



regio  
prese  
The b  
arran  
sheds  
centr  
the s  
a cat  
the l  
in to  
feed  
use o  
road  
been  
Conf  
of lo

at  
mer.  
are  
ed  
e  
f  
ng  
for  
ich  
the  
the  
l-  
as  
com  
feet  
sily.

Until recently many logs were allowed to go to waste in the operation bec use of their distance away from the skidder and loader and various other causes. This waste is now practically eliminated. None of the hardwoods, except Yellow Poplar, are cut. The principal cut is divided between Loblolly Pine, Cypress and some little Longleaf.

The company tried, at one time the use of a portable gasoline engine for carrying back the cable to the woods. This method required almost a right of way crew to brush out for the portage of the gasoline engine and the use of a couple of mules to pull the engine to the various places.



The company at one time tried to drain certain of their swamp lands by means of canals. After quite a large expenditure, the idea was abandoned as unpracticable.

Some time ago three snatch trees were rigged up for skidding and used instead of the present system. This method had many disadvantages, its only advantage was that it permitted the skidding of trees from all directions.

The logs were at one time cut into sixteen foot lengths and made up in bundles on the car. At the terminal, a windlass, operated by a gasoline engine, would pick up the whole bundle and slide it into the river.

Before the terminal was established, the logs were rafted to the mill in Charleston from a point three quarters of a mile further up the river. The loss of so many logs from sinking, and the lowness of the water at this point, caused the removal of the landing to a more convenient point. It also led to the establishment of the present system of making the logs up in bundles.

#### PRESENT LUMBERING.

At present, the lumber industry in this region is more or less intensive. Timber once considered unmerchantable is now eagerly sought for. All bodies of timber of any size are owned by the larger firms and corporations.

Lumbering by the E. P. Burton Company is done entirely by steam. Sixteen miles of main tramroad lead into the heart of the timber. Side lines and branches at proper intervals enable the steam skidder to reach every portion of the felled area. At present the tract is being cut at the rate of 20,000,000 B.M. yearly.



## SECOND GROWTH AND FIRE.

### Reproduction:-

On account of the intolerance of the young seedlings, reproduction in virgin stands is totally lacking. In the short leaf pine stands where turpentine gathering and consequent fires have caused many windfalls and open places, reproduction is scattered in groups in its various stages of development.

The Loblolly Pine is without doubt the best grower and the best tree to encourage. Several trees were taken and measured 15" breast high at 35 years of age. The following is taken from Government Bulletin #56, Bureau of Forestry P33 to P36, and shows the great possibility of the Loblolly Pine:

#### Local Distribution and Occurrence.

Loblolly pine occurs throughout the tract from the wet swamps to the dry sandy uplands. It prefers, however, the intermediate flat moist lands, edges of swamps, and well drained bottoms. It occurs both in pure stands and in mixture with other species, developing well in either case.

#### Associated Species.

In the swamps themselves loblolly pine is seldom the dominant species, but is scattered throughout the forest of gums, cypress, oaks, maple, and ash. On the low islands in the swamps, along the edges of swamps, and on the large areas of moist flat land characteristic of the tract, loblolly pine occurs practically in pure stands. Such hardwoods as red gum, black gum, and stunted oaks, together with cypress and occasional pond pines, are generally present in the form of an understory, but are not important. As the moisture decreases, longleaf pine comes into the mixture, and when the soil becomes dry forms the main stand with loblolly as the secondary species.

#### Demands upon Soil and Moisture.

Loblolly pine is in no way fastidious in its soil requirements. With a good amount of moisture, it holds its place tenaciously on any class of soil. When, however, the soil becomes dry, it is easily ousted by the logleaf. In the wet swamps while it sometimes occurs in large numbers, it is generally kept back by the black gum and other hardwoods. The trees in such places are uniformly large, but probably grow more slowly than when on only fairly moist soils. That moisture, rather than quality of soil is the requisite for good growth is frequently illustrated by fringes of loblolly





MR. LUDFORD, WOODS SUPERINTENDENT.

ALSO SHOWS REPRODUCTION OF PINE ON  
ANNUALLY BURNED OVER LAND.

--O--

--O--





pine about the small pocosons in the midst of longleaf land.

#### Form and Development:

The loblolly pine attains good size in all situations. Trees up to 30" in diameter are common, but trees over 40" in diameter are seldom seen. The largest tree measured was 42" in diameter.

A height of 120' is often attained, and trees as high as 140' were measured. If grown in somewhat crowded stands, it has a long, straight, cylindrical bole, clear of limbs for 50 or 60 feet. In youth it has a long, broad, conical or ovoid crown, which as age increases dies off at the bottom and becomes smaller and more flattened.

#### Tolerance and Reproduction.

For a few years in early life loblolly will endure considerable shade, but for the best development, full enjoyment of light from the start is required. The shade of tall grass interferes with germination, but does not prevent it.

Loblolly pine reproduces well, provided that sufficient moisture is present and that fire is kept out. Trees begin to bear seed at an early age, especially when there is an abundance of light, but large crops are not borne until a diameter of 10" is reached. After this period some seed is borne nearly every year, with heavy crops at intervals of two or three years. Seed is carried a long distance by the wind, so that a few good trees will seed up a large area. Exposed mineral soil makes the best germinating bed. For this reason the plowing up of the soil in skidding logs by steam is an advantage. Seedlings tend to come up in even-aged, dense stands. Old fields are seeded up progressively from the edges, while in virgin woods, thickets come up adjacent to the dense stands where the light is good.

Natural thinning out progresses rapidly after the tenth or fifteenth year, the overtopped trees giving way and allowing the crowns of the dominant ones more room. Height and diameter growth are rapid at this period. Owing to repeated fires, the filling up of blanks on the drier lands is exceptional, but along the edges of swamps thickets of poles are generally present.

On the cut-over lands, reproduction, with few exceptions, has been excellent. This has been, however, the result of chance no attempt having been made to leave seed trees. Since the future value of these timber-lands depends on the reproduction of desirable species, seed trees must be carefully selected, and left standing, and fire must be entirely kept out if good results are to be insured.

#### Relation of age to diameter.

At 9 years of age the average loblolly pine is 1" diameter breast high; 25 years 8"; 50 years 16"; 104 years 25" 152 years 31"; 213 years 36". The fastest growth is made from the ninth to the twenty-seventh year, when it drops off slightly, and thereafter a uniform rate of growth is maintained until the forty-sixth year. Up to the eighty-third year growth is fair, but from then on it becomes slow.



### Relation of Volume to Age:

The average number of board feet in a single tree at 30 years of age is 65; at 60 years 315; at 90 years 550; at 120 years 760; at 150 years 965; at 180 years 1145; at 220 years 1365; at 250 years 1515. The greatest growth in volume is made up to the seventieth year. The rate then declines quite slowly and regularly to the one hundred and tenth year, after which it becomes irregular and drops off faster, but makes good growth up to the one hundred and seventieth year and fair growth to the two hundred and fiftieth year.

### Relation of Age to Height.

The height of a loblolly pine tree at 10 years averages 12'; at 50 years 86'; at 100 years 111'; at 150 years 122'; at 200 years 125'; at 250 years 127'. Height growth decreases rapidly from the tenth to the seventieth year, after which it is regular but slow to the one hundred and fortieth year. After the one hundred and fortieth year growth becomes too slow to be of any importance as a volume factor.

### Relation of Clear Length and Total Height to Diameter Breast High.

A tree 2" diameter has a clear length of 13' and a total height of 15'; one 5" diameter has a clear length of 17' and total height of 32'; one 10" diameter has a clear height of 28' and total height of 59'; one 20" diameter has clear length of 57' and total height of 100'; one 30" diameter has clear length of 61' and total height of 121'. The clear length (or the distance from the ground to where the first green limbs occur) at first increases much more slowly with growth in diameter than does the height of the tree. The clear length begins to increase most rapidly at the point where the growth in height begins to drop off slightly, or at about 8" in diameter. This rapid rate of increase in clear length continues until the tree is about 13" in diameter, after which it falls off rapidly as does the height, which has been increasing at a uniform rate of a little over five feet to each inch of diameter growth. The growth in clear length becomes practically stationary when the tree is 20" in diameter.

### Rate of Growth of Loblolly Pine.

The following table shows the growth in diameter breast high and in volume at different periods in the life of a tree, and the number of years required to grow one inch in diameter.

Period	Periodic Dia. B.H. Growth.	Periodic Volume Growth.	Time req to grow 1" dia B.H. during period.	Time req to grow 1" dia B.H. average Age. For total age of tree
Years	Inches.	B. Ft.	Years.	Years
20-30	3.9	.....	3	20
30-40	3.3	74	3	30
40-50	2.6	83	4	40
50-60	2.2	93		50
60-70	1.8	82	6	60
70-80	1.6	.....		70
				80





SHOWING LACK OF REPRODUCTION, OR RATHER  
THE EFFECTS OF OCCASIONAL FIRES ON REPR-  
DUCTION OF PINE.

--0--

--0--



In many places reproduction is so thick that judicious thinning at the present time would greatly increase the final yield.

By increasing reproduction for the first few years after cutting, by protection from fire, and possibly some planting, the resultant forest would no doubt repay any expenditures in this direction.

Under the present system, reproduction is, with a few minor exceptions, such as in severely grazed sections or in the swamps, directly proportional to accidental protection of the cut over portion from fire for the first few years directly after cutting. The areas thus protected have, in a few years, an exceedingly good stand of rather scattered second growth. In open places and in wind-falls throughout the greater portion of the tract, numerous groups of seedlings have sprung up, and with all the unfavorable conditions form a very favorable nucleus for future yield. On account, mostly, of surface fires and severe grazing, many open places are without evidences of reproduction, the young seedlings being destroyed before they are firmly established in their respective situations, and very unpromising conditions result. A system of fire protection for the lands for a few years after cutting, would in all probability give very excellent results. Such a protection could be had at very little expense per thousand B.M.

The tearing up of the ground and soil cover through the use of the steam skidder, makes an unusually good seed bed for natural reseeding. The injurious effects of steam skidding in the barking of trees, tearing up seedlings, however, more than overbalances the beneficial results in the form named.





## SECOND GROWTH AND FIRE, Cont'd.

### FIRES:

Most of the fires are surface or grass fires, which burn off annually, in the greater portion of the tract, the grass and young seedlings, which come up annually in the wind-falls and open places. Fires, in extremely dry seasons, penetrate the swamps, where their injury is very noticeable on the susceptible Cypress and the barked hardwoods. Fires are primarily responsible for the frequent pecky and unsound condition of the Cypress.

Crown fires are very infrequent.

Destructive fires passing over the land so frequently have reduced the humus covering of the soil in many places almost to the bare sand itself.

Fires are especially destructive to the young seedlings during the formative period, which is during the first four or five years. After the seedlings have passed through this vital period in their life history, the trees as they grow larger seem to acquire greater resistance to fire. There is probably some truth in the argument that the tree reduces itself to its environment, and will acclimate itself to certain adverse conditions. Whether or not the tree develops resistant qualities remains to be proved. The prevailing opinion, (and with a great deal of truth in it) is that annual fires are not so destructive as occasional fires. This is shown in protected situations which accumulate a large amount of undergrowth and grass, which, when fires do come, afford most excellent conditions. Occasional fires have done more damage to young and mature timber than successive annual fires.





--O--

"CUT OVER LAND."

--O--



It seems advisable therefore to allow annual fires when absolute fire protection cannot be had.

Although fires do not kill the larger trees outright, they severely scorch the cambium enough to check and retard growth to a very marked degree. The greatest injury from fire, however, is through the destruction of young seedlings, upon which the successful reproduction of the pine depends. The most destructive fires follow directly upon lumbering on account of the great amount of inflammable material left on the ground.

#### Results of Turpentining:

Evidences of the destruction of the pine forest by turpentining practised in some places over a hundred years ago, and the consequent damage from successive fires, are everywhere at hand, and can be seen in the form of old dead and decayed trees, some upright and some on the ground and on the remaining stumps of these trees.

The total destruction of an abandoned turpentine orchard requires only a few years. After turpentining, the fat or resinous contents of the tree accumulate in the "box", thus forming the very best and most favorable condition for intense fires and the entrance of insects and fungi. After a few fires have run over the ground, the tree either is so severely weakened as to be blown over by the slightest wind, or dies, and is left to decay and rot.

The boxing of long leaf and loblolly for turpentining has done much to destroy certain areas of timber on the tract  
See photograph.





OLD WINDFALL CAUSED BY SEVERE BOXING,  
AFTER WHICH FIRES WEAKENED THE TREES  
SO THAT THE WIND VERY EASILY COMPLETED  
THEIR DESTRUCTION. FIFTY SEVEN FALLEN  
TREES WERE COUNTED WITHIN A RADIUS OF  
150 YARDS AT THIS POINT.





### CUT OVER LANDS.

The present method of allowing all unmerchantable culled timber, tops, branches of felled trees, and all logs under 14', to lie on the ground, is the direct cause of the more intensive fires. Fires feed annually on this kind of material, destroying absolutely, in most cases, young growth coming up directly after lumbering. At a small cost of ten or fifteen cents per M. all tops and limbs of the felled area could be burned up a few months after cutting, and in this way greatly increase natural reproduction through lessening the intensiveness of the successive fires.

On a great many portions of the cut over lands, reproduction, on account of these fires, is totally lacking.





--0--

CUT OVER LAND SHOWING SECOND GROWTH.

--0--



CLIMATE.

The climate of this region is very variable, and is typified in the winter by a cold excessively humid atmosphere in the night, and warm and humid in the day time, the thermometer changing from 36 degrees to 70 degrees F., in a few hours, and in the summer is dry and damp alternately with varying temperature. Invariably, persons who are not used to the climate, find it very depressing and uncomfortable as well as sickening, because of the peculiar combination and the great daily variations of temperature and humidity. It is invariably the case that persons not used to the climate in a few years will contract malaria after which the skin turns pallid and sickly like. The negro seems to thrive on these conditions, and is usually in robust and healthy condition. The white (native) is usually thin, small of stature, and without exception has the pallid skin and complexion before described.

The general temperament of the people is very pleasing. They all seem to be happy and content with their conditions.

The negro is humble, and is under subjection of the white, and does all the menial services throughout the whole operation, domestic and otherwise.

SOIL.

Sandy loam in the southern part and slowly changing to almost pure sand in the north-western parts of the tracts, both of which vary in depth from a few inches to many feet, and are underlaid with clay and hard pan, which frequently forms an admixture with clay. With few exceptions, the conditions for tree growth are most excellent. The swamp soil is mostly a deep





—0— EFFECTS OF SEVERE GRAZING AND ANNUAL  
FIRES ON REPRODUCTION ON CUT OVER LANDS. —0—





heavy, wet, sandy loam, and varies in its moisture content according to drainage conditions.

#### GRAZING.

Throughout the whole tract, cattle, sheep, and hogs are allowed to graze. The chief damage through grazing is the setting of annual fires by the resident farmers to improve the range, the tearing up of young seedlings by hogs, and the packing of soil on severely grazed portions, so that natural reproduction is greatly retarded.

#### INSECTS.

The barking of trees by skidding, is sometimes followed by the entrance of insects and fungi to the tree through the wound thus formed. It is peculiar that where these insects have plenty of stumps to work on, injury to living trees is very slight if at all.

A few acres of living trees have been seriously attacked in this manner.



LABOR.

All log and lumbermen agree that labor is at least 25% poorer in South Carolina than in either North Carolina or in Virginia.

The poor quality of labor at this particular camp is probably due to climatical conditions largely. The degree of intelligence in this section is not sufficient to fill the position of Woods Superintendent. Even the men who fill major positions of responsibility, have, with few exceptions, come from the states north of South Carolina.

Labor is hired from \$1.00 to \$2.00 per day, the day being from daylight to dark. White bosses and negro foremen is the rule.

The E. P. Burton Company pays better wages than are the average for this region.





--0-- CONFER. THE MAIN STREET SHOWING GENERAL  
APPEARANCE OF THE HOUSES STREETS ETC. --0--



CONFERR.

Confer is the name given the permanent camp. Here is located the Commissary, the shops, and the town proper, all of which are described in detail in the following pages.







--O-- LOOKING DOWN COMPANY STREET AT CONFER. --O--



### The Town:

It consists of about 17 one story (about 30 X 30') frame houses, both single (2 rooms) and double (4 rooms) which are arranged to front on a 50' street. All houses are built on piles with a 15' front yard with spaces between all houses. The houses are all fenced in with wire fencing, nicely painted white and have a very neat and comfortable appearance.

The company house, for use of the company officials, is built on the same style as the other houses, only with more ample proportions, having a main hallway with an open fire place, one storage, three sleeping rooms, and a separately connected kitchen. It is very comfortable in its arrangements and equipment. Telephones connect the principal points of the operation, the McCay House, and Confer, and the terminal.

Different foremen and chiefs of woods gangs and shop men constitute the greater portion of the population of the town, all of whom are in the employ of the company. Negroes live throughout the whole woods. In some portions of the tract especially quarters, some never used, some abandoned, have been built by the company for the use of their negro employees. A great many of the white employees also live in the surrounding woods.

The social condition of the inhabitants is most pleasing. Everyone is happy, and with some exceptions, content with their mode of living.

A boarding house not in use at the present time owned by the company, and rented to individuals is located here.

The doctor lives in a combination house and office. He is salaried by the company, and the men. One dollar per month from married men and 50¢ a month from single men is deducted from





—O—

"THE COMMISSARY."

—O—



the pay of the men, for which medical attention is given with no other charges. The doctor lives in a company house which is equipped with a small pharmacy, besides living quarters. The company furnishes horse feed, house, office and necessary medicines. The doctor is allowed all outside practise which he is able to get, provided that employees get the first attention.

The woods foreman lives in the company house which is entirely for the use of the officials of the company.

The water for the town is supplied by the company through pipes to each house from an elevated tank which in turn is filled with a pump operated from the shops which are near at hand.

The excess water is drained from the street and lowland of the town by ditches leading into lower land.

A combined meeting and school house, with a seating capacity of 25 to 50 persons, is kept up by the company for use of the town.

#### The Commissary:-

The Commissary is a one story frame building, with a ware house in the rear connected by a platform with the railroad. There is one man in charge who is also time keeper. Supplies are brought in from Charleston by freight boat (not owned by the company) to the terminal where it is transferred to Log train and brought to the store.

The company operates the commissaries, one at the mill in Charleston, and one at Confer in the woods. The management of both is done by one salaried man, who acts in the capacity of paymaster, and is in the office in Charleston between times, and has one assistant at each store. The trade commanded in the woods is not only the employees of the company, but also the population in the region for miles around; the only competition being a few







--0-- THE COMPANY HOUSE AT CONFER. --0--



very small stores many miles away. The clerk besides his various duties in the commissary, acts as time keeper for the woods operation.

The commissary is well equipped, and handles every imaginable article from a pin to a baby go-cart. A great part of the trade is negro, and comes from the surrounding country which is full of this class of people.

The company operates the commissary, not as an investment, to make money, but as an accomodation to their employees.

The prices on some of the necessary living articles used by the people and sold at the Commissary are as follows:

Butt Meat (Cut from behind the jaw of hog)	10¢		
Grits (Homminy)	5¢	per	qt.
Rice (Swamp seed)	10¢	"	"
Breakfast Meat (Bacon)	18¢	"	lb.
Sugar	5¢	"	"
Coffee (Ground)	20¢	"	"
Bread	5¢	"	loaf.
Meal	5¢	"	qt.
Flour	-4 or 5¢	"	lb depending on quality.

List of articles kept for sale at the Commissary.

Corn cob pipes,	Paragoric,	Cloves	Iodine,	Shoe Polish
Root Beer	Ammonia	Sweet oil	Castoria	Witch Hazel
Peppermint,	Coal Oil	Camphor	Mucilage.	Gaiters,
Combs,	Braid,	Matches.	Belts	Socks
Shoes,	Hats	Overalls	Overcoats	Post cards
Dishes	Flour sieves	Lanterns	Lamps	Buckets
Coffee Pots	Dish pans	Wash basins	Oil cans	Wicks
Suit cases	Push carts	Underwear	Leggins	Stationary
Alarm clocks	Thread	Perfume	Soap	Pocketbooks
Playing cards	Ladies hose	Muslin	Ribbons	Thimbles
Doll babies	Pepper	Cheese	Potted Ham	Bologna
Spices	Jello	Sardines	Corned beef	
Baking powder	Pork Beans	Salmon	Postum	Macaronia
sausage	corn	Oranges	Washing Powder	
Cakes	Crackers	Beets	Tomatoes	Peaches





--0-- THE SHOPS AT CONTER. --0--



## List of articles, Cont'd.

Hallowi Dates	Canned tripe.	Pickles	Prunes
Mustard	Worcester Sauce	Cher-cher	Rock-candy
Flavoring extracts	Chewing gum	Laudnium	Stick-candy
Cough drops	Spitts Turpentine	Tooth brushes	
Syrup of Figs	Gier's Tonic for Grippe.		
Grove's Tasteless Chill Tonic.		Horse and Cattle Powder.	
Warner's Safe Cure for Kidney and Liver		King's Pain Killer.	
Rheumatic Wintergreen Cure		Milk of Magnesium.	
Dr. Mile's Nervine		Vital Tone Liniment.	
Dr. Pierce's Favorite Prescription.			

## The Shops.

One main frame building (about 25 X 75) roofed over with two small wings, several small storage buildings for nails, spikes etc, hand car shed, etc.

### Shop equipment:

3 to 6 men constantly employed, depending on amount of work to be done.

Anvil, forge and proper tool equipment.

Grindstone.

Stationary engine, boiler, and line shafting.

Drill press.

Lathe.

Small circular saw mill. (Not in use)

Pump to supply reservoir for town and water tank.for engines.

Cutting Machine.

Vises.

Bar and sheet iron.

Rope, wire and cordage,

Pipe and general mill supplies.

All light repairs to skidder, engines, loader and woods machinery is done in this shop. The equipment is sufficient for all ordinary purposes.







--0--

SKIDDER #1 UNDERGOING REPAIRS AT THE SHOPS.

--0--



The pump is used to supply water to two tanks, one for the town, and one for the engines.

A small supply house about 14 X 14 is used for storage of bolts, washers, shovels, saws, glass, pulleys. springs. valves, waste, mill supplies, etc.



## LAYING OUT THE WOODS.

### For the whole operation:

The estimating of the timber precedes the actual laying out of the woods for the lumbering operation, and is done in this particular camp by an expert estimator who is called in from the outside. Actual figures from the experience of the present woods superintendent, show that carefully estimated tracts come within 10% of the actual amount of standing timber.

Before attempting to lay out the woods, there should be made (when there are no previous maps to go by) a map of the region to be lumbered. This map should show the general estimates of the standing timber, the topography, rivers, creeks, railroads, swamps savannahs, and the distribution of species.

### For the whole area:

The operation of the E. P. Burton Lumber Company is on the permanent camp basis. consequently the site for the shops, houses, commissary and stables, was selected in reference to the following factors:-

1- The health of the men. This made necessary the selection of a well-drained situation away from the malarial sections along the river, and not in close proximity to swamps or savannahs.

2- A permanent situation. That is a point that could be used during the whole operation to the best advantage, that would not necessitate the removal of the houses, shops, etc, each year or two, and yet be close enough to the operation to make its economical management possible.

The advantages of a permanent camp are:

1- It provides homes for married employees, hence



aids the employment of a better class of labor.

2- It concentrates the commissary, shops, houses, engine houses, stables, etc., at one point, and makes its management more efficient.

3- The company derives a constant income from rents, thus making a system of this nature a paying investment as against the loss of time and money in the maintenance of temporary camps.

4- Such a system elevates the social condition of the employee, because schools can be established for the education of the children. Any improvements to the town proper can be made of a permanent nature, and finally promotes social intercourse between the people. The disadvantage of a permanent camp.

1- The impossibility of selecting a site that can be used during the whole lumbering operation to the best possible advantage in respect to economy of transportation to the constantly changing points of cutting, which, in the end, will be over the whole area.

After the site for the town was selected and located on the map, the next question was to decide the most direct route to the river for the main line of the railroad. This railroad route must be the most efficient for the least possible cost.

Great care should be taken in deciding for sharp curves. It is cheaper in the end to even expend on a large operation considerable money to make the line as straight and as level as possible.

Too much care cannot be taken in a large operation in the selection of the right of way for the main line. Bridges, costly to maintain, sharp curves, which mean wear and tear on rolling stock

The first thing I noticed when I stepped out of the train was the smell of the sea. It was a salty, bracing scent that seemed to fill the air. I had heard that the coast was beautiful, but I didn't realize how much it would affect me. The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before.

I had heard that the coast was beautiful, but I didn't realize how much it would affect me. The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before.

The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before. I had heard that the coast was beautiful, but I didn't realize how much it would affect me.

I had heard that the coast was beautiful, but I didn't realize how much it would affect me. The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before.

The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before. I had heard that the coast was beautiful, but I didn't realize how much it would affect me.

I had heard that the coast was beautiful, but I didn't realize how much it would affect me. The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before.

The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before. I had heard that the coast was beautiful, but I didn't realize how much it would affect me.

I had heard that the coast was beautiful, but I didn't realize how much it would affect me. The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before.

The sun was shining brightly, and the waves were crashing against the shore. It was a sight I had never seen before. I had heard that the coast was beautiful, but I didn't realize how much it would affect me.



and more power to operate, steep grades going out, all go toward making the operation more expensive, and should be eliminated, or tolerated only after careful consideration. The ideal railroad line for logging is one that is the shortest distance from all points of the future operation to the terminus. This of course is impossible, but it is the ideal toward which we should strive, and upon which we should base our plans.

The E. P. Burton Company, during the past year, has reduced many sharp curves and grades on their main line at great expense, finding it more economical and a paying investment.

For a particular tract:

The ~~clear~~ cutting system down to a 14' diameter limit on the stumps, is used entirely in the woods. Consequently it becomes necessary, inasmuch as logging is done entirely by steam, to plan the operation so that all railroad lines can be within reach of the entire area which has been felled. The object is to cover as much territory with as little railroad as is possible, and at the same time with the least possible expense considering the existing conditions. After a study of the map of the particular tract to be lumbered, the usual plan is to run a temporary main line through the tract, with side tracks and spurs at right angles every 300 or, in rare cases, 400 yards, so that the set-ups will meet each other on a line between the spurs. The main a side spurs ✓ in the required direction are then located by use of a compass, the three stake method and paces. Curves are laid off by offsets, and after being properly staked out, the right of way crew, con-sisting of from two to six men (negro foreman) grub out and clear



the right of way, preliminary to the laying of the track by the track gang. The "set-ups" are then distinguished between each other, suitable spar trees (which are blazed) are picked out by the foreman of the sawyers, who alots each crew a given portion of the set-up to fell. The usual method is to log first up and then down one spur, so that the removal of the railroad to new locations can be accomplished in a constant and economical manner.

The right of way gang consists of a negro foreman, and from five to ten men, depending on the amount of work to be done.

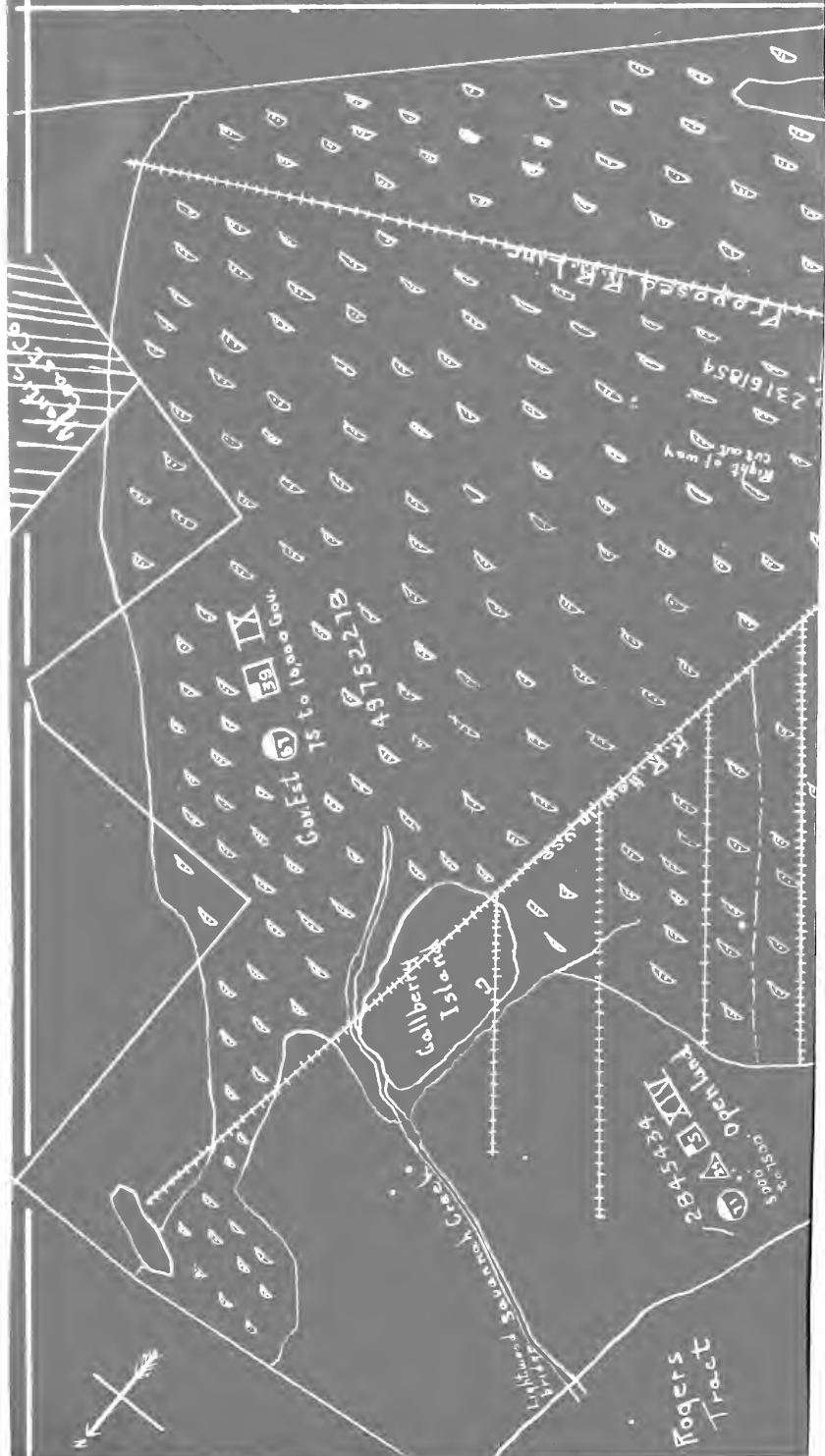


PLATE #1

This plate shows the general method used in logging by the E. P. Burton Lumber Company. It can be seen that from the temporary main line numerous parallel spurs or side lines are constructed from it on one side only. The method employed is to cut up along one side of the railroad and back on the other side, thus allowing the constant removal of rails, giving thereby steady employment to the track gang. After removing the track from one spur, new spurs are laid in advance.

This idea is carried on through the whole operation, that is. one side of the temporary main line is logged going out, and the other side coming in, and also along the main line for the reason stated above.













## CUTTING AND FELLING.

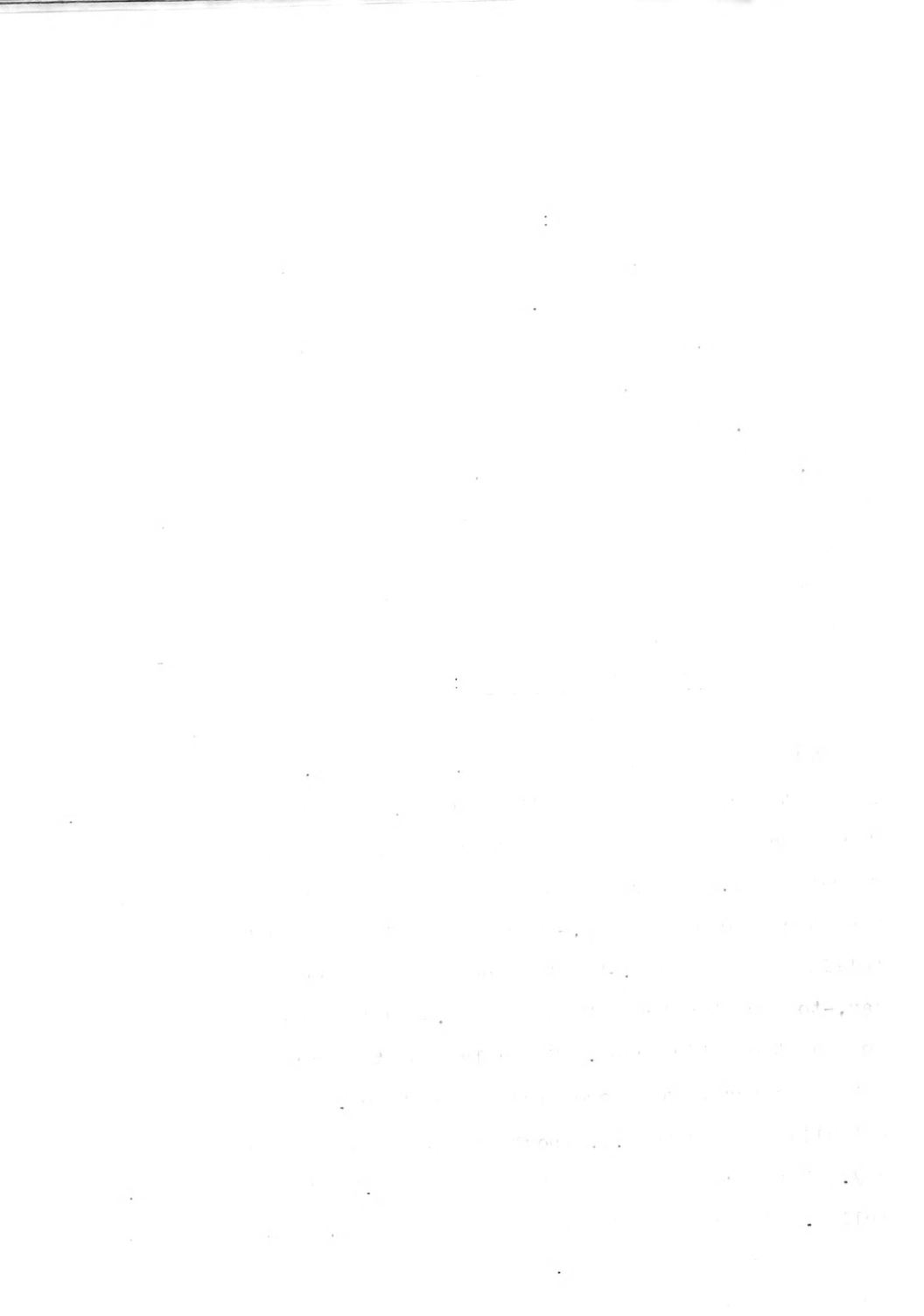
### Treatment of Species:

After October, or rather in winter months, cypress is girdled four months before cutting. In the summer, this period is reduced to two months. A separate crew of from two to three men girdle the trees with axes, at a distance of from two to four feet from the ground. The girdle is merely a notch cut through the cambium layer, entirely around the tree, the result of which is to reduce the specific gravity of the wood, by allowing presumably, the escape of a part of the moisture content of the tree.

The cypress is the only species treated previously to cutting in this operation.

### Description of Cutting Gangs:

After the woods are properly laid out and tracked, the cutting and felling of the trees is begun. ten gangs, each gang consist-  
ing of two sawyers and a white foreman, make up the felling crew. The duties of the foreman are to tally the amount of timber cut by each gang,-to mark all the stumps after each days cutting,-to keep the time of the men,-to select suitable spar trees before felling is commenced,-to allot each gang a certain area to fell,each day,-to mark the trees to be felled,-and to oversee in general the work of the entire crew. The salary of the foreman is constant, but the several gangs are hired by contract. The company has established an 8000 B.M. (Doyle rule) limit for each crew for each day. Each crew is paid at the rate of \$2.50 for each 8000 B.M. felled. The company furnishes all the tools, oil, filer etc., and a water boy in hot weather.





CUT OVER CYPRESS SWAMP, SHOWING DESTRUCTIVE

--O--

LUMBERING, CYPRESS KNEES, AND THE METHOD OF

--O--

GIRDLING THE LIVING TREES.



Method of Cutting:

The trees are cut into 32' lengths a distance up to 75 yards from the "skidder". For distances over 75 yards the logs are cut full length, unless trees are excessively large, in order to save carrying the cable so many times to the woods. The reason the trees are cut into 32' lengths close to the road, is because the logs can be pulled in faster than they can be loaded on the cars. It is, therefore, advisable to cut the trees immediately around the skidder set-up, into short logs.

The foreman of the felling gang has instructions to cut all 1000 B.M. trees into two lengths, because of the distance from the cables and the chance of breakage.

Two sawyers, or one gang, can cut their days task (8000B.M.) before 12 o'clock.

The tops of the trees are always felled to or away from the skid tree, never at right angles. Should a tree fall crosswise, it is always cut into short lengths, but this, however, is only an occasional happening.

The "log run", so usual in the north, is not used in this section, on account of the great variability in the density of the stand.

The felling gang cuts from two to three set-ups ahead. One crew is not allowed more than 8000 B.M. each day for a weekly average. The crew is, however, allowed to work ahead and then lay off.

The single bit axe is used entirely and is furnished by the company. The filer (furnished by the company) sets up his portable bench near the felling operation, and files each saw that is





in use from two to four times a week. It is said that a saw properly filed and used should cut 40,000 B.M. The area cut over each day depends on the kind of timber, and varies from five to eight acres each day.

The trees are now cut with stumps from 2 to 2-1/2' high. If possible, even at a cost of 10¢ per M, this waste, which is in the very best part of the tree, should be utilized, at least, in part, by cutting closer to the ground. The stumps now left in the ground in the woods, have, in a great many cases, as much B.M. as the top log. Closer cutting would mean not only a direct saving in the timber, and would greatly reduce the expense of skidding. An investigation into this matter would no doubt prove financially profitable.

Amount of timber saved by cutting stumps 1 and 1-1/2'  
from the ground, instead of 2' (Forest Service Bul.#56)

Diameter. breast high.	Gain by cutting one foot stumps.
10	3
13	7
16	10
18	12
20	16





SHOWING POSITION OF THE SKIDDER IN  
RELATION TO MAIN LINE, LOADED CARS,  
AND THE "SPAR TREE".

--0--

--0--



## SKIDDING.

As before stated, logging is done entirely by steam tramways and skidders. Spurs are run in from temporary or main lines to the particular tract to be lumbered (spurs are usually one-quarter of a mile apart) The skidder is arranged on a suitable side track along the main line (see "Moving the Skidder"), and, after cables pulleys etc, are properly arranged on the spar tree, the skidding operation proper is begun, and this operation in details is as follows:

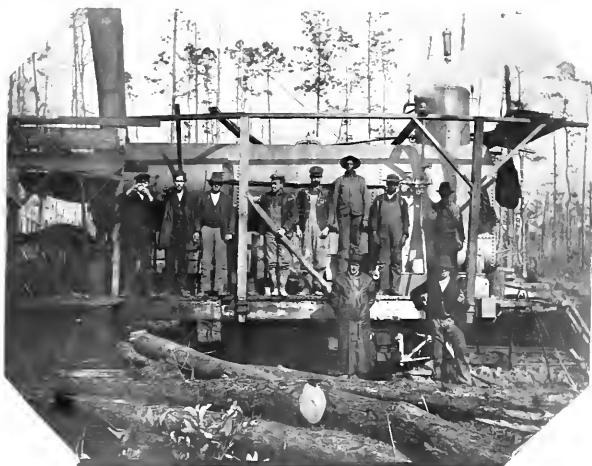
The skidders used are of the semi-portable, single cable, two skidding drums and one loading drum, type. For skidding, the cable is fastened to the skidding drum and run through the pulley on the spar tree (see Plate #1) and then pulled into the woods by mules. The cable is attached to the single tree, and the mule boy in the saddle guides the mule to the particular tree to be brought to the track. A "tongsman" unloosens the cable, fastens it to the tree (preferably at the small end), and, after getting out of the way, motions the "signal-man" who in turn signals the "drum-puller" to go ahead. The tree is then pulled to the railroad where it is loaded on cars by the loading gang.

The single cable, with the return to the woods with mules, two skidding cables and one loading cable, is the general plan of the three skidders in the operation. The return cable system is not practical, because of the openness of the stands, a fact which would necessitate moving too many times.

### Notes on Skidding Operation:

Logs are sometimes brought to the track in relays. Pulleys attached to stumps through which the cable is run allows of





--0-- SKIDDER #3 WITH CREW. --0--





Notes on Skidding Operation, Cont'd.

pulling at an angle.

Two skidders and one loader are used constantly.

Logs and trees are skidded from 50 to 250 yards from the set-up.

The amount skidded each day varies from 20,000 to 40,000 B.M.

per skidder, depending upon the size of the timber.

Ditch water is usually used for the boiler. Sometimes it is necessary to dig and pump the water from wells, and in extremely rare cases water is hauled.

Sometimes "set-up" will last for a week or more, depending on the size and density of the timber. It is usual, however, to change every three or four days.

One days run of skidder #3 was 202, 32' logs, average 8-13" diam.

Skidding cables are from 900 to 1200' long

Loading cables are from 200 to 300. long.

The cables last from two to six months, depending on kind of pull, size of logs etc.

Only one serious accident has happened in the last seven months.

Light wood is used for fuel.

In cold weather, the water is drawn from all exposed pipes to prevent its freezing.

Eighteen to twenty snatch blocks or pulleys are worn out each year.

Two mules are used constantly on each skidder, and sometimes three or four, the number depending mostly on the topography, length of haul and class of timber.

The work on the whole operation is divided up between eleven mules, working in relays usually from early morning until noon and from noon until night.

The mules are kept as close to the operation as possible in



Notes on Skidding Operation, Concl'd.

enclosures 30' X 30' which are built of saplings with hay racks in the center. Hay and feed are brought to the terminal by boat and hauled on the tramroad to the operation.

Skidding and Loading Crew:

The skidding and loading crews are combined into one gang of 18 or 20 men depending on the length of haul, topography and various other conditions.

Two skidding crews, each consisting of the following men, with their duties described.

One foreman; man in charge of the crew.

One 1st drum puller. Operator in charge of #2 skidding drum.

One loading drum puller. Operator in charge of loading drum.

Two tongsmen. Men who fix cables to the logs in the woods.

Two signalmen. Receive and transmit signals from the tongsmen to the drumpuller.

Two loaders or log storers, Men who load logs on the cars.

Two sawyers. Cut trees, which are skidded whole length from the woods, into 32' lengths.

Two woodchoppers. Supply fireman with wood fuel.

One fireman. Fires and cares for boilers.

Two riders or mule boys. Ride mules into woods with cables.

Rigger. Has charge and rigs up spar tree.

Helper to rigger.

One half of the time of the rigger and his helper is charged to each skidder.

SIGNALS: 2 blows of whistle, #1 drum to go ahead.  
3 " " " " " " " "  
1 " " " " " " " " stop.





SKIDDING. SHOWING A NUMBER OF LOGS  
BEING MOVED CLOSER TO THE RAILROAD  
WITHIN REACH OF THE LOADING CREW.

--0--

--0--



### MOVING THE SKIDDER.

The manner in which the skidder is moved into the siding especially made for it before being rigged up for the pulling and loading of logs, is very interesting.

After the spar tree is located, the main track which passes it six or eight feet away, is broken from sixty to ninety feet in front of the tree. The track is moved over on the side on which the tree stands, and is connected up with enough rail to reach the spar tree within a few feet. The skidder is then moved by its own power onto this side track. After the skidder is located on the siding, the main track is then connected up as before. After the skidder is properly braced, it is ready to be rigged to the spar tree for skidding.

In moving the skidder to a new set up, the main line is connected to the side track, and the skidder is moved to the main line again.

Sometimes the locomotive is used to place the skidder into the new position. See Plate, for rigging of spar tree.







THE LOGS ARE SKIDDED AND PLACED IN THIS  
MANNER ALONG THE RAILROAD. THE LOADING  
CREW TAKES THE LOGS FROM HERE AND LOADS  
THEM ON CARS IN THE MANNER SHOWN.





---0---  
TYPICAL LOGGING ENGINE WITH SHOPS AND  
WATER TANK IN THE BACK GROUND.  
---0---



## LOADING.

The loading of the logs on cars is done in part with the skidding crew. One of the three drums on the skidder is used for loading, The cable attached to this drum, instead of having a "shackle" is equipped with tongs, which are of such a nature that when the cable is taut the jaws of the tongs fasten themselves into the log. The cable is so arranged that it hangs down vertically over the car, so that when the tongs are fastened to a log in the center and the drum is revolved, the log is swung directly over the car where it is adjusted and dropped upon the car beneath. It is the duty of the loaders or log-storers to fasten the tongs to the log, give signals to the loading drum-puller, to "jog" the log into place, and, after the car is properly loaded, to fasten the logs securely to the car with chains.

Fifteen cars, averaging 2000 B.M., is the maximum daily output for the loading crew on each skidder. The loader has a maximum of ten cars a day.

The crew of the loader consists of six men: Foreman, drumpuller, tongsmen, signalmen and rider. The loader cannot skid, but can drag logs from the near vicinity.

The loaded cars average from 15 to 20 logs, varying for 8"-16" diameter per car. One train with ten cars carries 163 logs from 8 to 16" diameter.



## RIGGING UP THE SPAR TREE.

### Present method. (See Plate #2)

One "rigger" and helper, whose time is charged one half to each skidder, rigs up the spar trees for the two skidders. With a pair of climbers, ropes and pulley are attached or fastened to the desired position (usually 75 feet up the spar tree). The heavy guy cables 1" and 1-1/4" diameter, are pulled up with the ropes and pulleys, and fastened to the tree, which is guyed to the ground about 200' away on the four sides, thus making the tree able to hold and support very heavy weights.

The skidding pulleys or snatch blocks, are then pulled up and fastened, one on each side of the tree, with chains, after which the ends of the skidding cables from the drums, are pulled up, passed through the pulleys, pulled to the ground again, and after the shackles have been attached, are ready for the skidding of logs from the woods.

Then the loading pulley block, (after the loading cable is run through) is put on one of the guy cables and placed directly over the track, and is held in place by wires, one passing to the tree and then to the ground where it is fastened around the spar tree so that when unfastened will allow the block to go down the guy cable to the ground, the other wire passing parallel with the cable to the ground and fastened there. The shackle and tongs are then fastened to the loading cable which completes the rigging for work.

The rigging rope is left on the tree, so that if a block needs repair, or a rope gets out of the sheave, or any other trouble which might need attention up the tree, a man can be easily pulled up by hand with this rope.





RIGGING UP THE SPAR TREE, Cont'd.

To un-rig the tree, the cable holding the loading pulley is unfastened at the ground which allows the pulley to go along the cable to the ground. The guy cables are unfastened, and the tree is felled, after which all cables and pulleys, not taken off before, are unfastened from the tree.

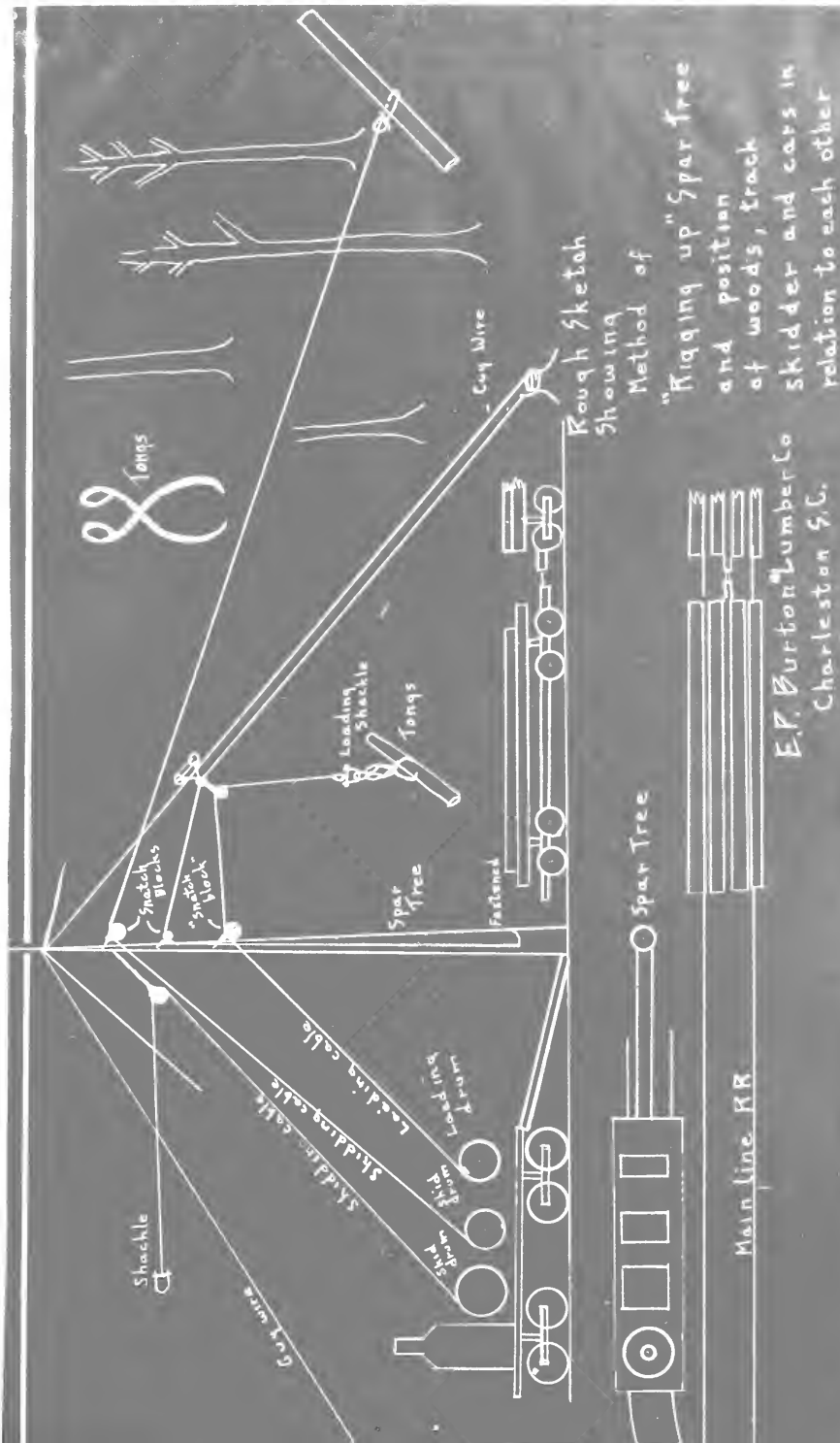
Old method of Rigging up the Spar Tree.

An old method for rigging, used a year or more ago, required the use of three trees, called snatch trees, all of which had to be guyed up separately, requiring three times as many wires and ropes, as well as sometimes half a day or more to properly rig up the tree.

The advantages of the present one-spar method as described on the preceding page (#13) are as follows:

- 1- Reduces danger of breakage at least 25%
- 2- Requires only  $1/3$  the amount of heavy guy cable.
- 3- Requires only  $1/3$  the time to rig up the tree preliminary to work.







## RAILROAD OPERATION.

### Description:

The railroad proper consists of about twenty miles of railroad altogether, sixteen miles of main track and about four miles of sidings. The whole system may be divided into three divisions:

1st- Main lines--built in a very substantial way for permanent use; ties 18" to 20" apart, grades and curves reduced as much as possible, and kept in good condition. Grades on the main line are being constantly cut down. The main line is always laid as straight as is consistent with topography and expense.

2nd- Temporary main lines--No great expense is laid on the construction of these temporary main lines. The ties are anywhere from two to three feet apart. No grading is done, and no special care is taken to keep the track up to any standard.

3rd- Spurs--These are only used for a few weeks at a time, and are graded only enough for their immediate use. Ties are laid from two and a half to three and a half and sometimes four feet apart.

### Laying the track:

The level condition of the country, makes the laying of the track comparatively easy. After the general direction has been determined, the proposed right of way is cleared of underbrush, and when level, ties are laid down flat on the ground and the rails securely fastened with spikes. The ties



RAILROAD OPERATION, Cont'd.

are laid from two to three feet center to center depending on the nature of the road, branch or main line, topographical factors curves, etc. When rolling country is encountered, the main line is made as level as possible, taking advantage of contours wherever possible. The grades on the main line are constantly being improved and the curves reduced.

Maintainance:

The maintainance of the track is in charge of three crews, varying from five to ten men each. One crew maintains track from the river to Confer, one from Confer to the McCay House, and the other lays the track in the woods. At present one crew of six men and foreman does the work from the river to the McCay House, and one crew of from six to ten men lays and maintains track in the woods from the McCay House on. Ties are cut by contractors (at five cents each) from the company land, and furnished as needed. The ties are placed eighteen inches apart on the main line, and from two to three feet apart on temporary main lines and spurs. The track in the swamp is underlaid with saplings sixteen to twenty feet long which are nosed and sufficient in number to form a solid foundation for the track, and to elevate it a foot or more above the water level.

The permanency of the construction of the track in the swamps depends upon its use, whether for main, temporary, or spur lines.

Thirty and forty pound rails  $1\frac{1}{2}$  X  $4\frac{1}{2}$  spikes are used.

The gauge is standard 4'  $8\frac{1}{2}$ "

A right of way gang of from one to six men (depending on the amount of work ahead) clears and brushes out the right of





RAILROAD OPERATION, Cont'd.

Maintenance, Cont'd.

way preliminary to the laying of the track by the track gang, and works along the line laid out. Along the permanent lines or main track, the right of way has been ditched for drainage during the rainy season.

Costs 30¢ per yard for laying swamp track,

Costs 15¢ per yard for laying regular track.

Cypress, gum, pine tops, and inferior hardwoods are used for ties. Thirty and forty pound rails are used.

The Running of the Trains:

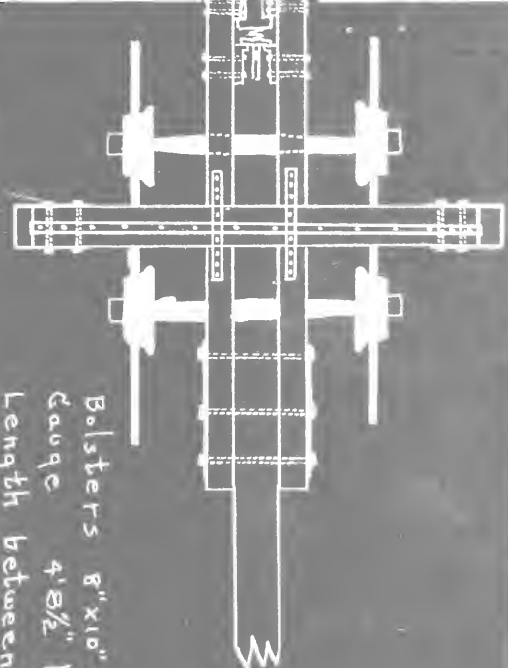
Each engine uses about three cords of light wood per day, and is operated by an engineer at \$2.25 a day and fireman.

The engines leave Confer at five in the morning, one for the terminal with the load of logs brought in the previous evening, the other with empty cars brought from the terminal, and an old passenger coach with the workmen for the operation, which is about twelve or fourteen miles from Confer at the present time. The railroad operation is done on the relay system. One engine bringing the cars to Confer and returning to the woods, and the other engine taking the train and shifting for unloading at the terminal. Three trips a day is the usual run. On its last trip for the day, the woods engine leaves the woods at six P.M., and brings not only the log train, but also the passenger coach with the workmen to the terminal.

The engines are supplied with water for the boilers, from ditches, creeks, and two water tanks. All engines are equipped with injectors.



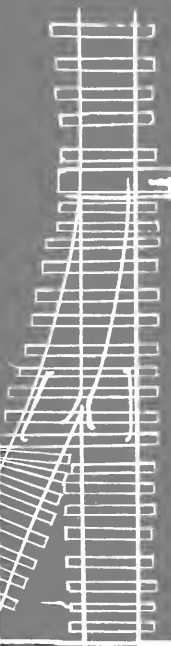
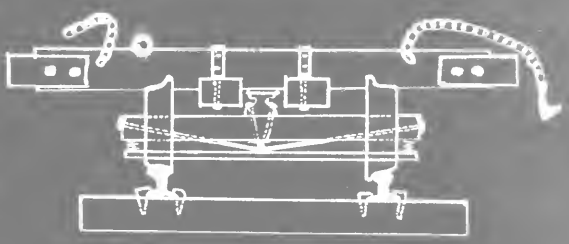
Logging cars used by  
The E. P. Burton Lumber Co  
Charleston S.C.  
Scale  $\frac{1}{8}" = 12"$



Bolsters 8"x10"x8'6"  
Gauge 4'8 1/2" Wheels solid 2'0 dia. 5" wide  
Length between center of wheels  
on each truck 3'0"

30 # 40 # rails

Trucks coupled 250 between  
centers of each truck for  
320 logs





RAILROAD OPERATION, Cont'd.

Capacity of the Road:

Ten to twelve cars are hauled in each load averaging fifteen to twenty logs, 32' long, and or about 2000 B.M. per car. The engines are sometimes stalled on the grades (none of which are over 4%) but usually can take the whole load over the line without a stop. Each engine burns about three cords of wood a day.

Equipment:

- 2- Manhattan Elevated engines of the four driving wheel type of about sixty ton each.
- 1- Baldwin Locomotive, four driving wheels, about sixty ton.  
(Both of the above styles are for use on sharp curves and steep grades.)
- 32- Log cars, standard gauge, eight wheels (all in use)  
see sketch.
- 2- Flat cars for hauling supplies.
- 1- Flat truck for railroad gang for hauling ties, rails etc.
- 3- Hand cars,
  - 1- Shanty or Passenger Car.
- 2- Tank cars, (Not used at present)
  - 1- 6 HP (Fairbanks-Morse) Sheffield Gasoline car for use of superintendent.
- 1- Flat car at feed house.
- 2- Water tanks along right of way; one supplied by an artesian well, the other by a pump from a sunken well.

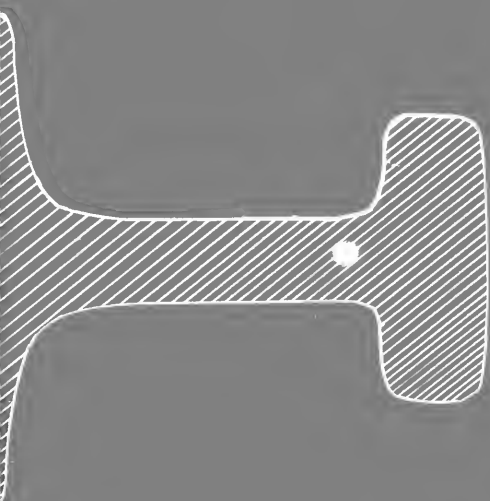
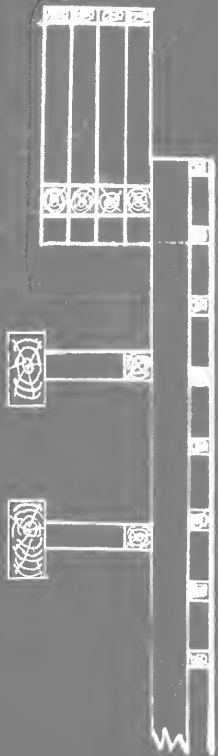
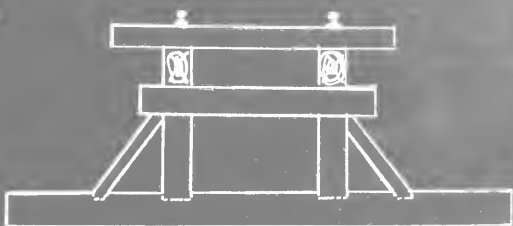
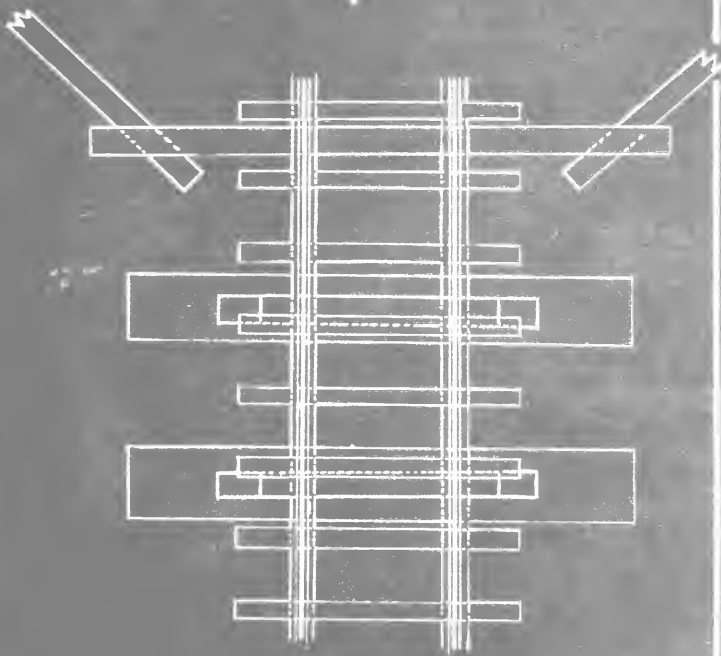
Fuel:

Light wood is used entirely for engine fuel at a contract



# Bridges

Showing general method  
of construction of bridges  
E. P. Burton Lumber Co  
Scale  $\frac{1}{4}" = 12"$







RAILROAD OPERATION, Cont'd.

Fuel, Cont'd.

price of \$1.00 per cord, cut in two foot lengths, and delivered on racks along the railroad, from the company's land. Six to twelve negroes are kept constantly busy hauling wood a distance varying from just along the right of way to two to three miles in the woods. The hauling is done in two-wheeled dilapidated mule, ox, and horse carts which will carry anywhere from one to three cord feet to the load. Usually one man can cut and deliver stacked up, from  $3/4$  to  $1-1/2$  cords a day, depending on length and kind of haul, character of the wood, and the ambition of the individual, both horse and nigger.

Light wood is the sap or resinous portions of the tree which has usually been previously turpentine.

Ties:

Ties are furnished by contract at 5¢ a piece for 5 to 6" face, and are hewn out of pine tops, young cypress, and gum.





17

--O--

"THE TERMINAL."

--O--





THE TERMINAL. A train load of logs has just been run on the trestle, and the men are in position for <sup>un</sup>loading.



UNLOADING AT LANDING AND BUNDLING.

The terminal:

Terminal is the name given to the landing where the logs are delivered from railroad transportation to transportation down the river (The Cooper River), and consists of a storage shanty for storing various articles in use at the landing and supplies brought up the river for Confer, a trestling built out into the river about 400' on which the loaded cars are run and the logs dumped into the river, and the equipment used in bundling the logs. (See drawing)

The terminal is thirty miles by river from the mill in Charleston.

"A trestle is built out into the river and the carloads of logs run out upon it. Two chains are then fastened to the trestle below the cars, passed down into the water, and again attached to a windlass on a framework above the trestle. As the logs are thrown into the water they are caught in the loops of the chain, and when a sufficient number to make up a bundle has been thrown off the cars the chains are tightened and the logs bound together. By this means the lighter logs float the heavier, and no loss occurs unless the logs loosen in the bundle and slip out. This seldom happens." The bundles are from 15 to 20 logs each. (Gov. Bull. #56 Bureau of Forestry P30-31)

The bundles are then floated to a convenient place in the river, and after a sufficient number (usually from thirty to forty and sometimes seventy five bundles) are arranged in rows of fours chained together, they are towed by tugboat to the mill.

Five men constitute the "river" or unloading crew, one foreman in charge, two unloaders who unload logs with cants into the





UNLOADING AT LANDING AND BUNDLING, Cont'd.

river, one bundler who chains logs together into bundles, and one man at the winch who tightens and slacks the cable on signal.

It requires about one hour to unload and bundle the logs from six cars.

The tug boat is owned by a company consisting partly of the E. P. Burton Company, and tugs the logs to the mill by contract. It requires three tides or about one and one half days to make the trip to the mill.

River Equipment:

- 1- 15HP 40' Gasoline Launch (old style)
- 1- Gasoline launch for use of Woods Superintendent.
- 1- Flat Boat (Approximately 16 X 40) or lighter for hauling heavy supplies, engines, cars, etc, from Charleston.
- 1- Log Recoverer Suspended Windlass between two boats.

NOTE: For the costs of all the various operations described in the preceding pages, see Cost Sheet following.





THE TERMINAL, SHOWING THE ARRANGEMENT  
OF THE BUNDLES FOR TRANSPORTATION TO  
CHARLESTON.

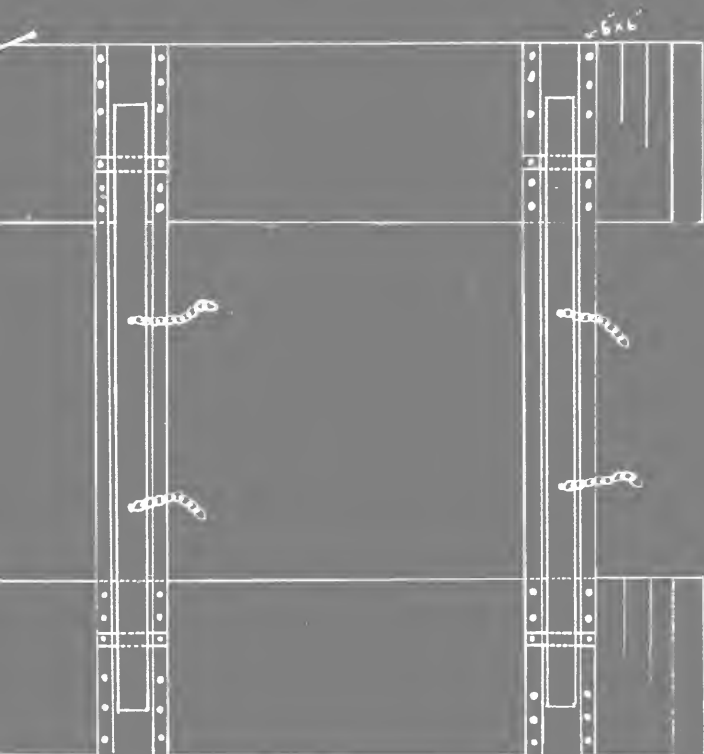


E.P. Burton Lumber Co  
Charleston S.C.

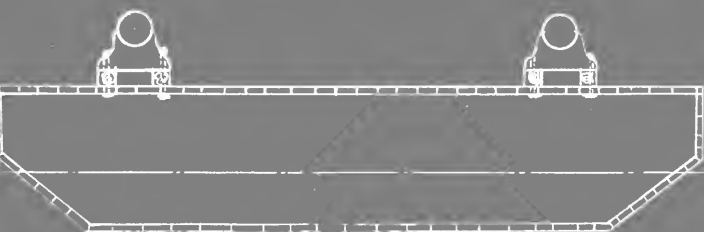
# Log Recoverer

Scale  $\frac{1}{4} = 12'$

Measurements only approximate



Each boat 6'x12'x4'  
By use of chains  
operated by windlass  
sunken logs singly  
or in bunks can  
be removed from  
the river



Water line  
Without load





--O-- "CUT OVER LAND." --O--





ELLIOTT H BURT

OTATIONS WILL BE  
ONE WEEK FROM D  
NUMBER OFFERED R

TELEGRAM



# MAP OF COOPER RIVER HOLDINGS. OF THE E. P. BURTON Co. BERKLEY CO., S.C.

1903.

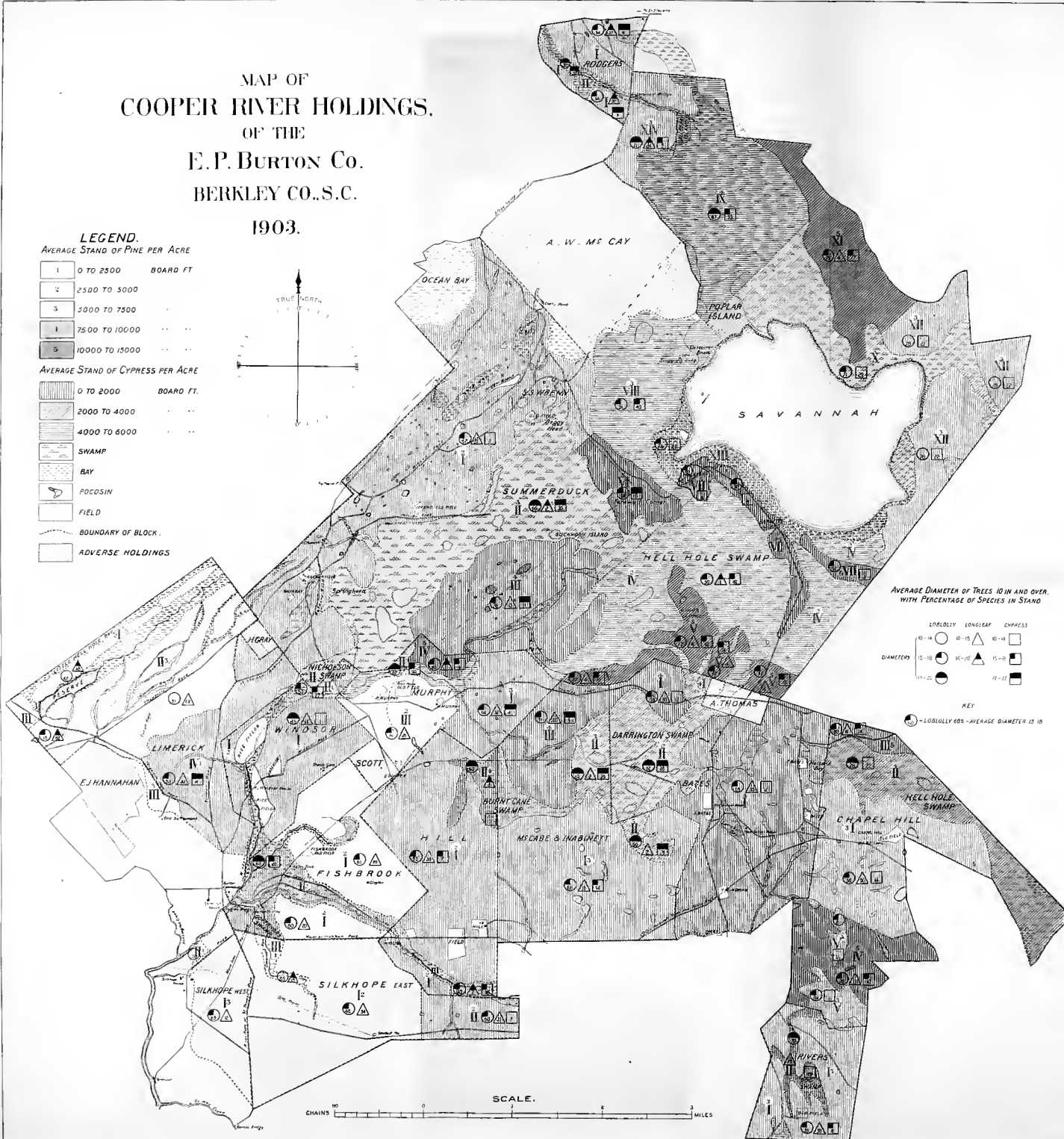
## LEGEND.

AVERAGE STAND OF PINE PER ACRE

1	0 TO 2500	BOARD FT.
2	2500 TO 5000	
3	5000 TO 7500	
4	7500 TO 10000	
5	10000 TO 15000	

AVERAGE STAND OF CYPRESS PER ACRE

1	0 TO 2000	BOARD FT.
2	2000 TO 4000	
3	4000 TO 6000	
SWAMP		
BAY		
PODCOSIN		
FIELD		
BOUNDARY OF BLOCK.		
ADVERSE HOLDINGS		



AVERAGE DIAMETER OF TREES 10 IN. AND OVER,  
WITH PERCENTAGE OF SPECIES IN STAND

	LOBLODY	LONGLEAF	CYPRESS
10-14	○	△	□
15-18	●	▲	■
19-22	⦿	⬤	⬛

KEY

⦿-LOBLODY 60% - AVERAGE DIAMETER 12 IN.

SCALE.  
CHAINS 0 1 2 3 MILES



ATIONS WILL BE SUSTAINED  
ONE WEEK FROM DATE, PROVIDED  
NUMBER OFFERED REMAINS UNSOLD

ALL AGREEMENTS ARE CONTINGENT UPON  
STRIKES, ACCIDENTS AND OTHER DELAYS  
UNAVOIDABLE OR BEYOND OUR CONTROL

*Manufacturers of  
Cypress and White Pine, North Carolina Pine*

TELEGRAPHIC AND  
BU  
CHAR

FOREMAN

D. P. Co. 50749

CODES  
B C (4TH & 5TH EDITION)  
TERN UNION AND TELECODE

DEPARTMENT		TIME	RATE	Check
Date	190			

SYNOPSIS TIME CARD  
foreman is  
at & turn in

Y.

E. P. BURTON LUMBER CO

Week ending

DEPARTMENT	WAGES	FT. LOGGED	COST	AVE.
Felling				
Mule Logging				
Steam Skidder				
Boo				
Ste				
Rail				
Shop				
Fuel				
Bund				
Railro				
Conife				
Forest				

E. P. Burton Lumber Co.

Pay envelope used by  
E. P. Burton Lum  
Company.



17 - 0 - 12

LETTER OF DIVISION

OF

THE EASTERN DIVISION OF THE U. S. ARMY,

PER. 1000, S. C.

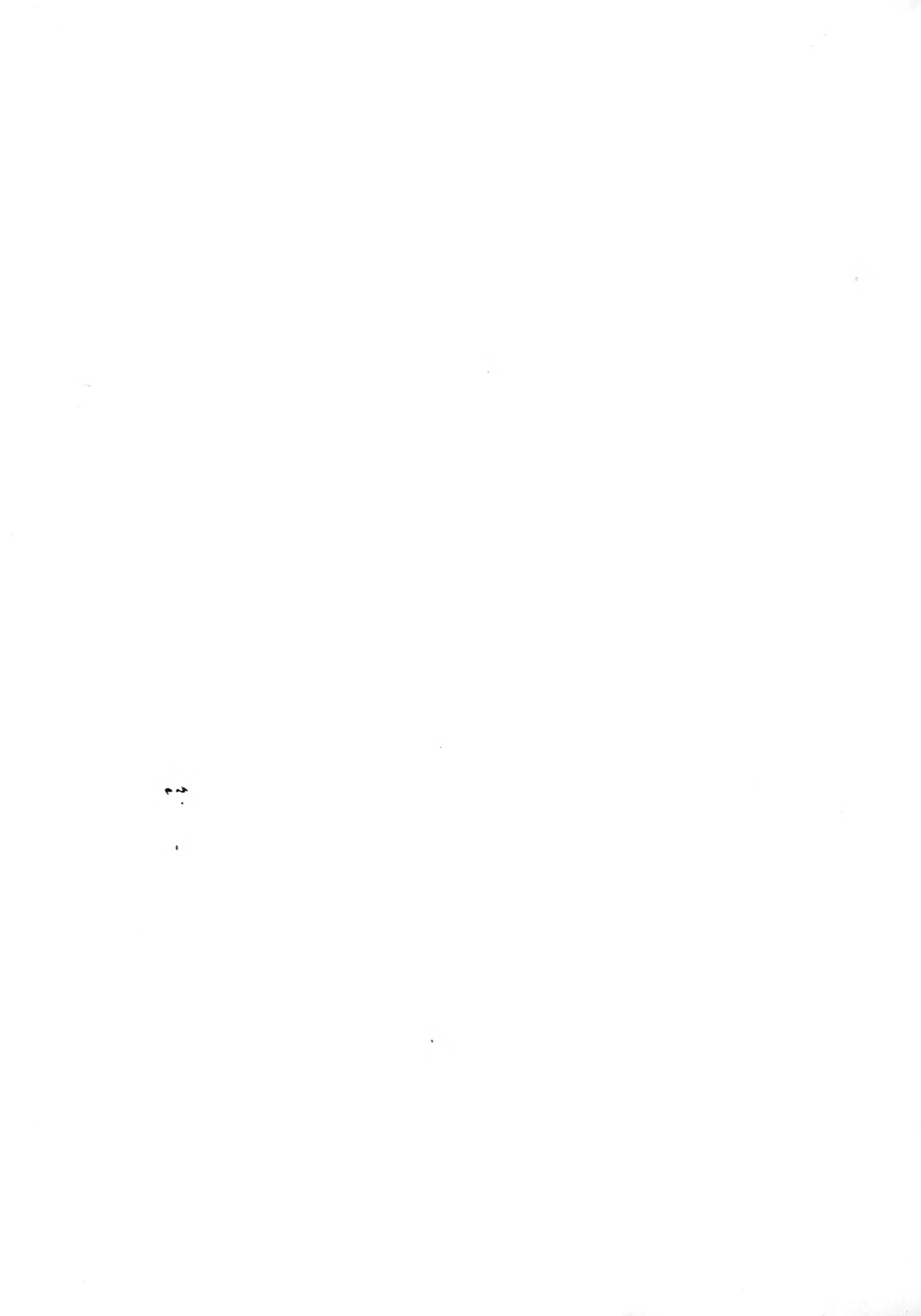












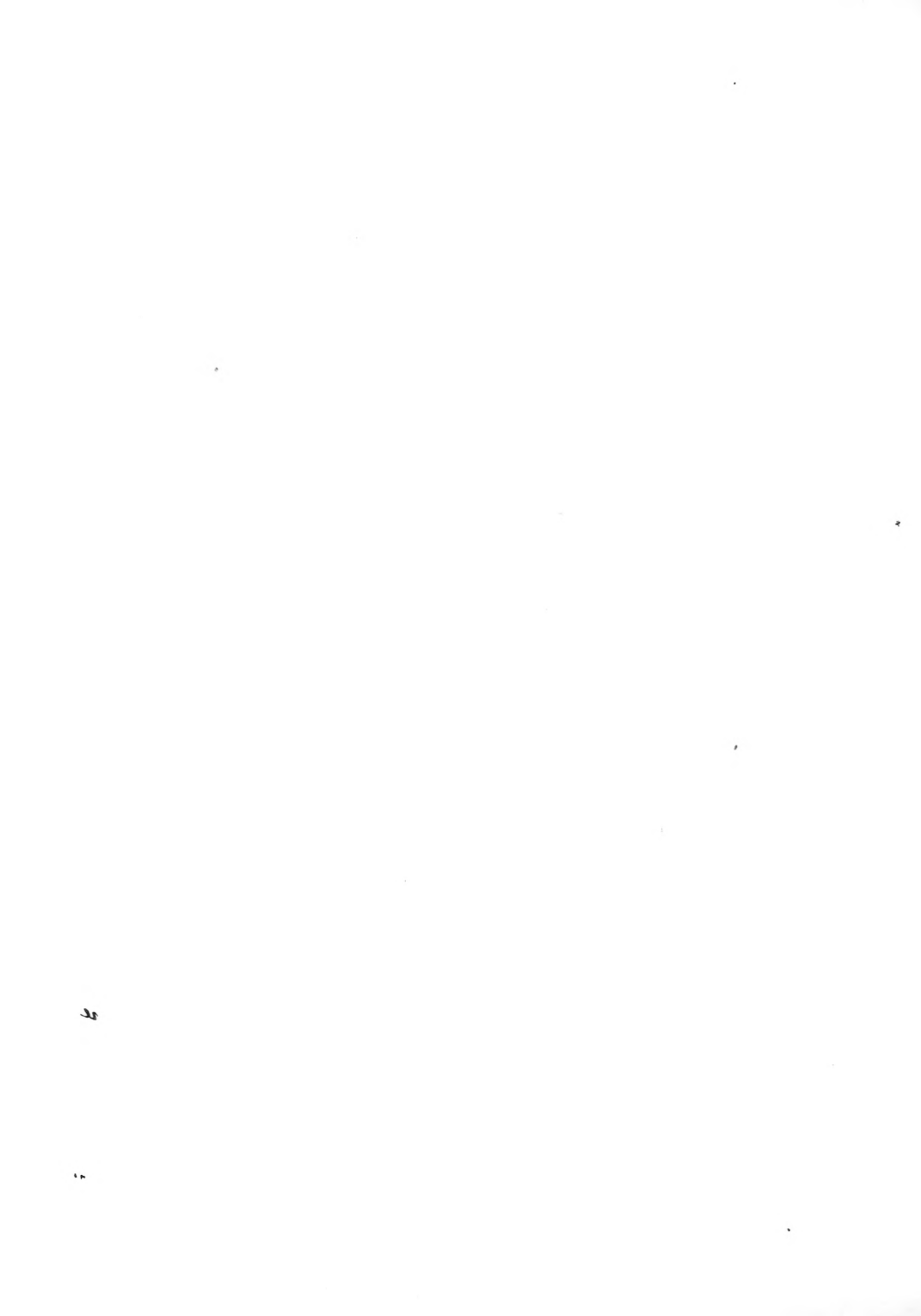
to be gotten out; so new methods are devised to cut the difficulties encountered. The first is certain trees of course such as the cypress and a large amount of that can be seen floating transported from the forest to the mill, many by means of the stream, owing to the expense of cutting is evidenced solely for the timber. Green cypress, however, is so heavy that it scarcely floats and probably gets lost in the logs, especially those with the largest amount of water in them, and is being lost.

To overcome this difficulty, various methods of driving the log out of the log, before they can get into the river, were tried; using the skidding system, a cable being run to the log, then pulling the log and floating it down the river to the mill before they were floated. In some cases, the timber lying on the river was cut first. The logging utilized the available supply it became necessary to extend the cutting back from the rivers. Here again a more efficient method was not applicable and now as was said to be originated. The old boat system was the result. By this system it was necessary to build canals. These usually were thirty feet wide and six feet deep and cost about \$100 per mile. As in the previous method the trees were skidded. After felling the logs were pulled in by means of skidding lines on the pull boat. Here the logs were gathered together into rafts and towed to the mill by tug boats. As time wore on more efficient and economical methods were employed, <sup>and</sup> to-day steam skidding and railroad hauling is rapidly displacing the method. This change makes the work much simpler and more economical from almost every stand point.

Twenty-five years ago when the logging operations of the lakelands were at their height, very little lumbering was













of the seeds and the young. The tree, with its very slender trunk, is not so tall as the oak, and its leaves are smaller and more numerous. It is a tree of the same family as the oak, and its bark is very similar to that of the oak. This valuable material is used for many purposes.

The bark of the tree is very thick and is used for many purposes. It is a very valuable material and is used for many purposes. The bark is very thick and is used for many purposes. The bark is very thick and is used for many purposes. The bark is very thick and is used for many purposes.

In the bark of the tree, there is a very valuable material. It is a very valuable material and is used for many purposes. The bark is very thick and is used for many purposes. The bark is very thick and is used for many purposes. The bark is very thick and is used for many purposes.

White Oak	Fraxinus americana
Cyclops	Fraxinus americana
Cottonwood	Fraxinus americana
Red Oak	Fraxinus americana
Elm	Ulmus americana
Red Oak	Fraxinus americana
Spanish Oak	" p. strabo
Water Oak	" nigra
" "	" latifolia
Shingle Oak	" i. brionia
Willow Oak	" phellos



Thickets                      long 1/2 m  
Silver Birch                  long 1/2 m  
Larvae                        small a 1/2  
of 1/2 m                      small 1/2 m

in the 1/2 m                      small 1/2 m  
forest. It was found                  small 1/2 m  
of 1/2 m                      small 1/2 m  
of 1/2 m                      small 1/2 m

GA 1/2                      d 1/2 m  
1/2 m                      small 1/2 m  
1/2 m                      small 1/2 m  
Thickets                      small 1/2 m  
1/2 m                      small 1/2 m  
1/2 m                      small 1/2 m  
1/2 m                      small 1/2 m  
1/2 m                      small 1/2 m

With the exception of a few                  small 1/2 m  
of the class of 1/2 m                  small 1/2 m  
better advantage of 1/2 m                  small 1/2 m  
or as considered 1/2 m                  small 1/2 m  
larger also than any other species found on the forest.

The forest of the high mountains                  small 1/2 m  
of the forest are practically free from insect injurious influences,  
and, except in a few cases, little fear need be entertained of the  
loss of growing timber. The principal causes of injury that  
might be expected are

- Windfall
- Fire
- Insects
- Fungi

















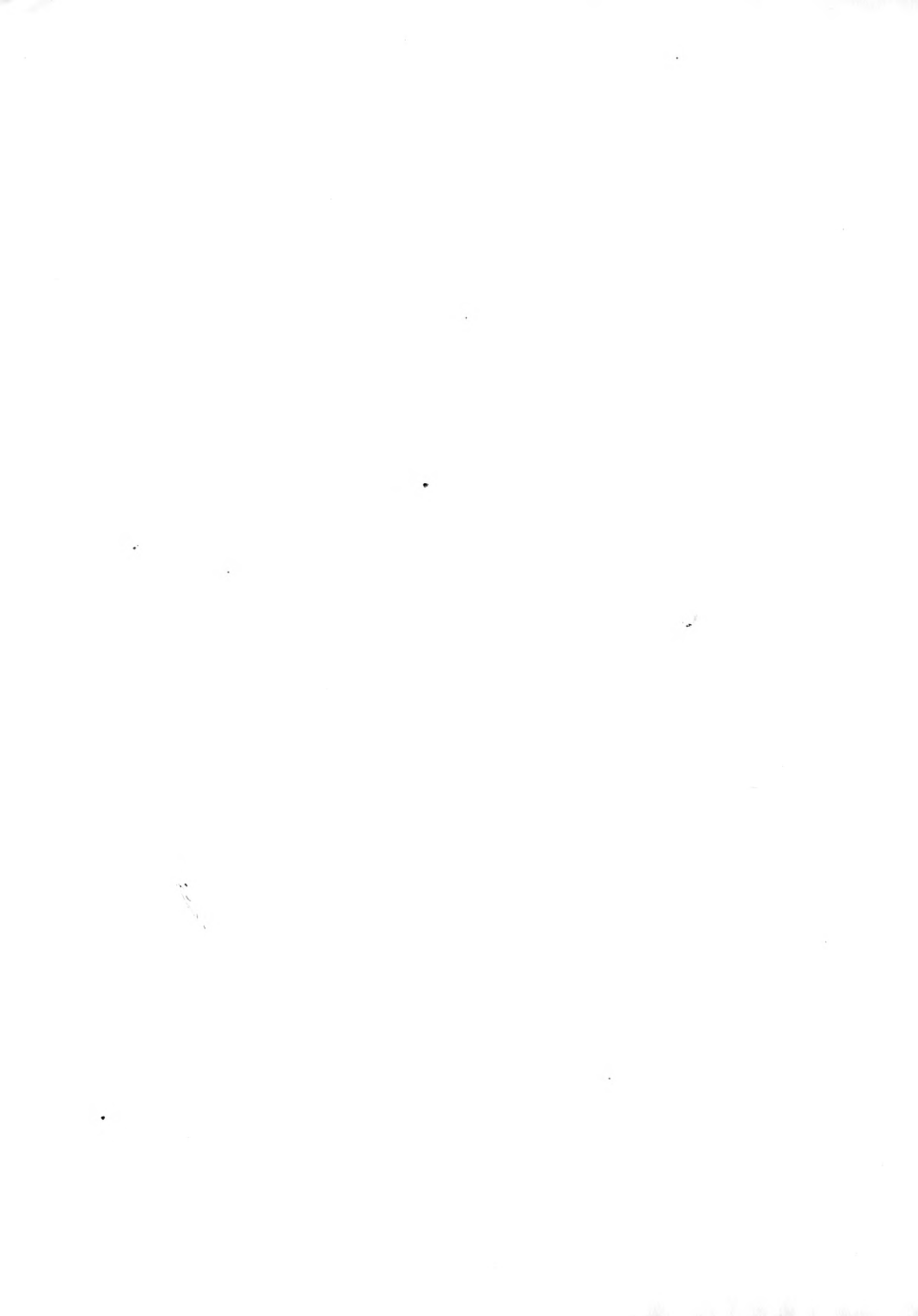




1. They cover a strip approximately 15 feet wide and 1000 feet long, of all standing trees, in order to place a clear runway for the cables.

11. They choose and fix the good and strong for the fixing of the guys running from the tower of the simulator.

3. The outfit is equally set with two main wire rope cable 1000 feet long and 1 1/8 inches in diameter. Then after the skidder has finished the set this crew pulls them in cable to the second set from this point and attach it to the tail tree





















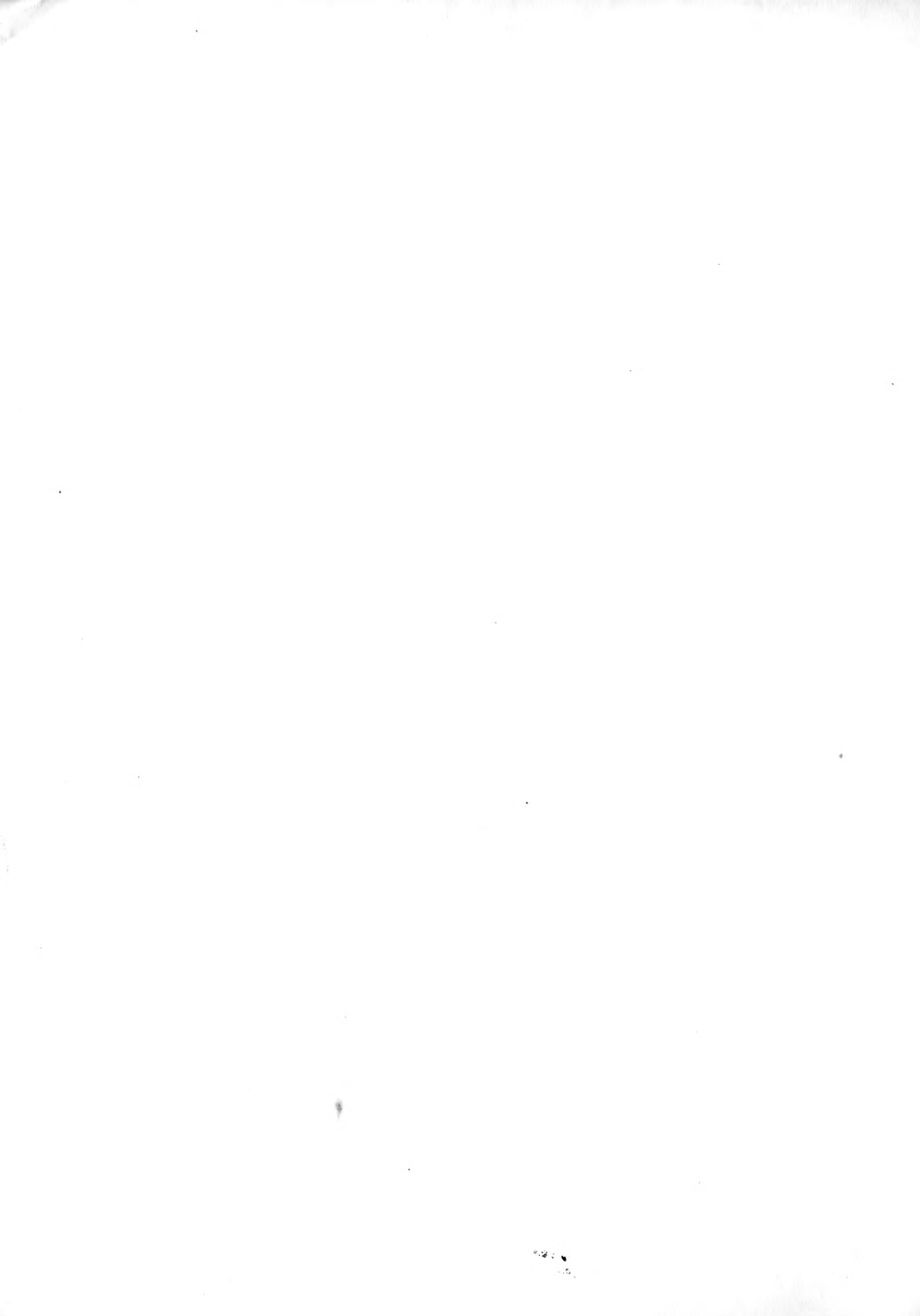






according to species and grade. The National Hardwood Lumber Association grading rules are used on all products. At the extraction of gum, and the saw holes together with bark are graded according to special rules of the Company under license. All lime is graded according to the North Carolina New Standard. From here the logs are broken down in sections by a saw and to smaller extent by chisels to the grade. The final grade of boards is then brought to the mill. The capacity of the mill is 4,000 F.E. per day, which is being gradually increased.

There are two kilns, one 12 feet long, 12 feet wide and 12 feet high. The two are together cost \$7,500.00 and the equipment for them, including cost of \$12,000.00. They are built of steel. This is a decided advantage as it is a non-conductor of heat. The lumber is piled on car trucks six feet long, three feet wide. Sixty layers or courses of 2" x 4" x 12' lumber is piled on a car. This is approximately 5000 feet. Three-quarter inch strips are used between courses. Each kiln has a capacity of 10 cars. The kilns are separated into two parts by means of an asbestos curtain. The lumber in the first compartment is subjected to a live steam pressure of 200 pounds and a temperature of 180 to 200 Degrees Fahrenheit. After remaining here for ten to fourteen days it is pushed on back past the curtain and is subjected to a decreasing pressure as it approaches the other end. It takes ten days to kiln dry 1 inch lumber and from fourteen to sixteen days to dry 1 1/2 inch stuff. The kilns were built by the Grand Rapids Vencer Company and are especially adapted for the successful







The Company runs a fully equipped general store for the accommodation of the employees. No credit is given but the





Company has a system of clearing for the land. The amount of the proceeds issued to them is reported regularly. The total annual production of the town is about 100,000 for year.

The whole town of Panguan, P. O., is controlled by the <sup>River</sup> ~~the~~ <sup>Cyprus</sup> Company. It has about 100 men and 75 horses which are used to clear the river. These horses are rented to the company for a fee of \$1.00 to \$1.50 per month. A hotel is located in the town. Transients pay for their accommodations at a rate of \$1.00 per day but for the employees of the company it is given. There is a river which runs through the town and a road runs along the river. The river is very muddy and the condition of the town is in a state of decay. The company is run into the river and the town. The company is quartered together in one end of the town, near the river. It may be said they have a town of their own. The company is laying out their decision upon the <sup>same</sup> ~~land~~ that used in the town proper.

Although every precaution has been taken to keep down the amount of sickness, still the summer months are of great danger. This is due largely to the mosquito carrying the malaria. Almost every inhabitant of the place is affected with the disease. Frequently a more serious sickness is manifest, usually following malaria, that is the Hemorrhagic fever. This causes a sudden and very horrible death. The men, by giving



from their pay 25¢ each week. They are liable to pay the physicians 50¢ each after 5¢ a day for the first 10 days of their families and also 5¢ per day for the remainder of the time. The mine owns two chief mills used in the operation.

The Carter River Company has been organized and is controlled by the following:- Mr. F. John Dillman, President; Mr. Treasurer, Chicago, Ill.; Mr. J. B. Green, Secretary; and Mr. F. R. Kelly, General Manager. The company has been organized for the following associations:- The Timberlands of the Bar Owners Association, The North Carolina Lumber Manufacturers Association, The Lumbermen's Association, The Lumbermen's Association, The Lumbermen's Association, The Lumbermen's Association. The mill, located at Panguitch, B. C., is the only one of its kind ever constructed for the purpose of to legally remove the natural log pile which covers the area of the river. It is 100 feet long and has a capacity of six million B.F. The mill was first constructed and at first it was only used to log down the Carter and collected here, but on railroad logging proved its applicability in this region the number of logs driven down the river decreased greatly and at the present time there form only a small percentage of the total number. The mill was first a circular mill but was converted into a double-belt mill some years ago. The entire cost of the present plant including equipment is \$250,000. The capacity of the mill is 10,000 B.F. per 10 hour day, but at the present time the mill turns out only 30,000 B.F. which is a 30% overrun. The total the saw 50,000 B.F. can be turned out per day. The timber lands owned by the Company lie in twelve counties and the tax rate varies more or less in these counties. In general, however, the rate







Fire insurance is carried on the property at a fire  
insurance carried by the Company costs \$300.00 per year.

The following is a compilation of the cost per 1000 B.F.  
and number of men employed in the various operations:-

	Cost per M.	No. of men
Laying and tearing up of track		7 - 9
Chilling - - - - -	.50	30 - 30
Gas filing and electric machine shop -		5
Shilling and loading (including R.P. fuel)	1.40	40
Unloading - - - - -	.40	7
Sorting - - - - -	.50	40
Grading and sorting - - - - -	.50	7
Planing - - - - -	1.35	20
Dry kilning - - - - -		
Box shop - - - - -		5 - 8
Machine, blacksmith, pattern shops and foundry - - - - -		8
Yarding, including repairs - - - - -	.75	32
Loading and shipping finished product -	1.50 - 1.50	35 - 60
Power plant - - - - -	.50	17
Selling (including cash discount, travelling expenses and commission)	1.30	4
Office force - - - - -	.35	9
Supplies - - - - -	.50 - .60	









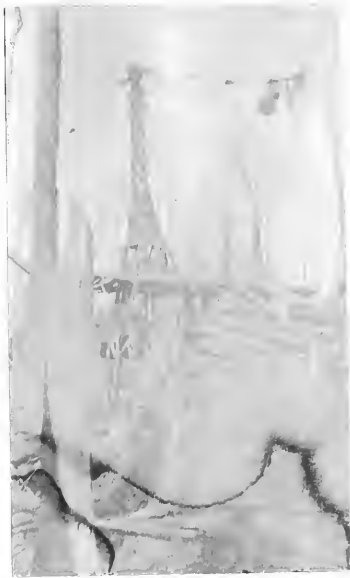
The Commission has on July 1, 1901, received from the  
United States Department of Agriculture a letter of transmittal  
dated July 1.

Enclosed herewith is a letter from the United States  
Department of Agriculture dated July 1, 1901, and a letter  
from the United States Department of Agriculture dated July 1,  
1901, and a letter from the United States Department of Agriculture  
dated July 1, 1901, and a letter from the United States  
Department of Agriculture dated July 1, 1901.

Very respectfully,  
:

N. M. Goodyear.  
R. F. Heringway.





Skidder moving  
the case out  
the trench.



The combined skidder  
and loader at work.





Lawrence is  
the engineer in  
the -



Bringing logs  
in to the sheder.







Logs skidded in and  
awaiting to be loaded.



Typical swamp land.





*The remains  
after logging.*



*The loader.*





The loader at work.



Making the logs  
Lump into place.





An explosion  
near the tent.



Car of special design.



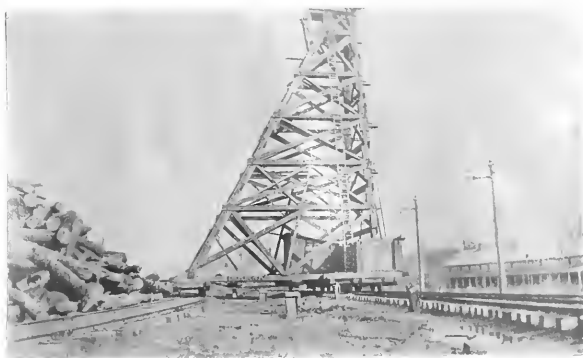




Boom in the river  
to get the logs floated  
by contractors from  
far up stream.







Radial tower for unloading  
and conveying logs from yard  
to the mill. Showing how  
the strain is taken up; also  
the track on which it moves.

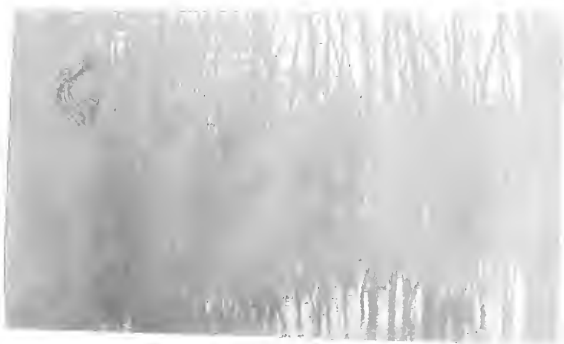


view of the log yard.

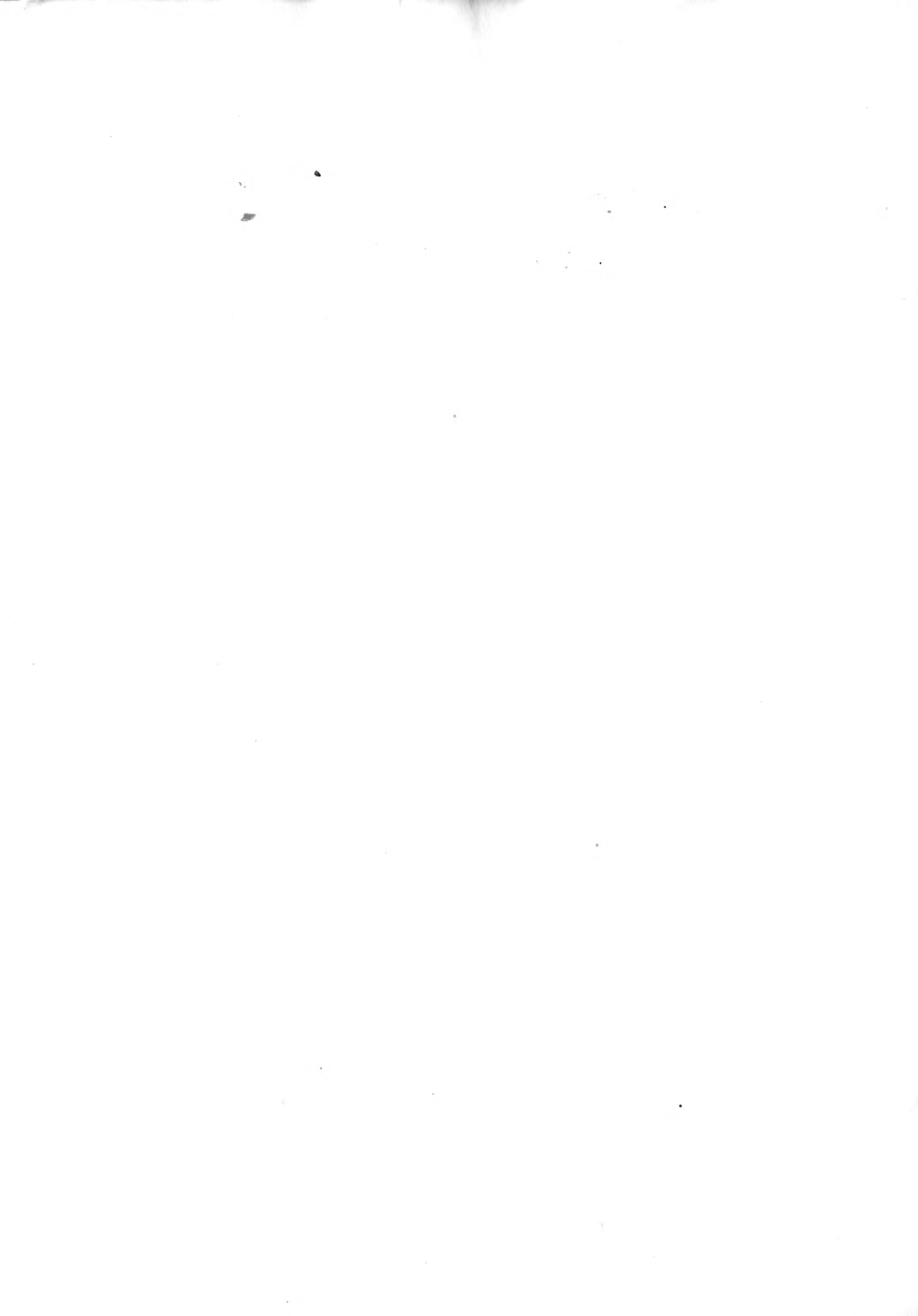




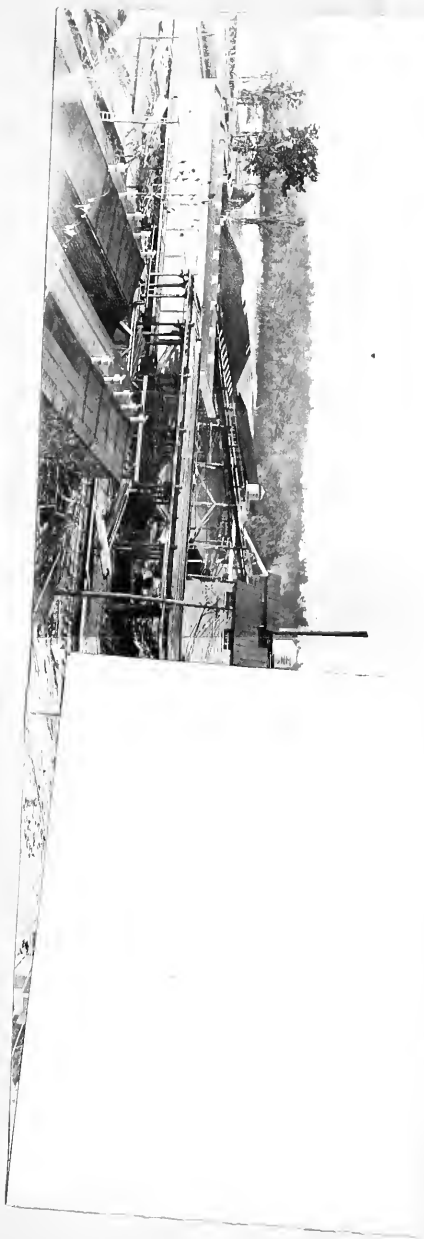
Pile driver at work  
laying new track.

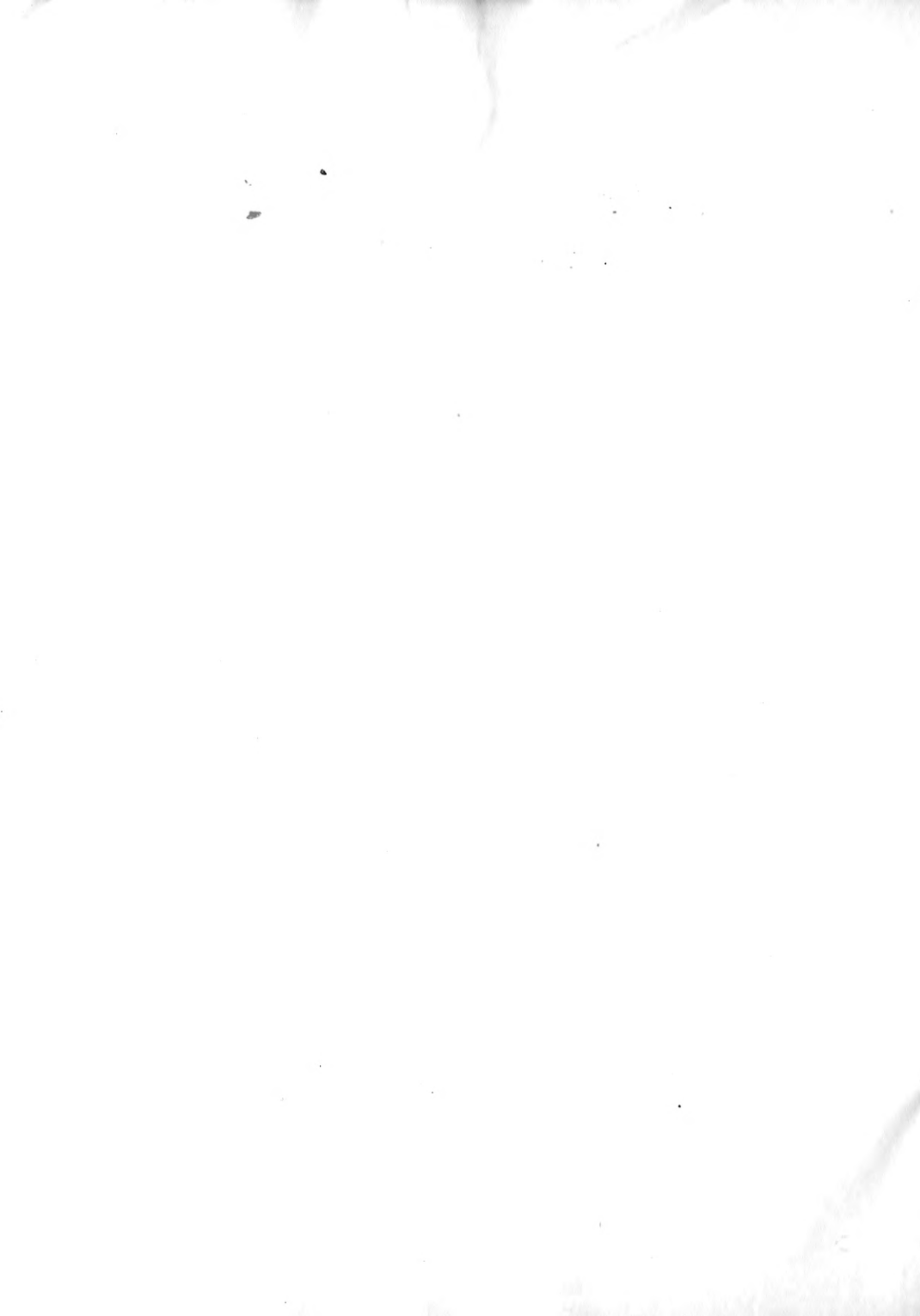


Typical swamp land.

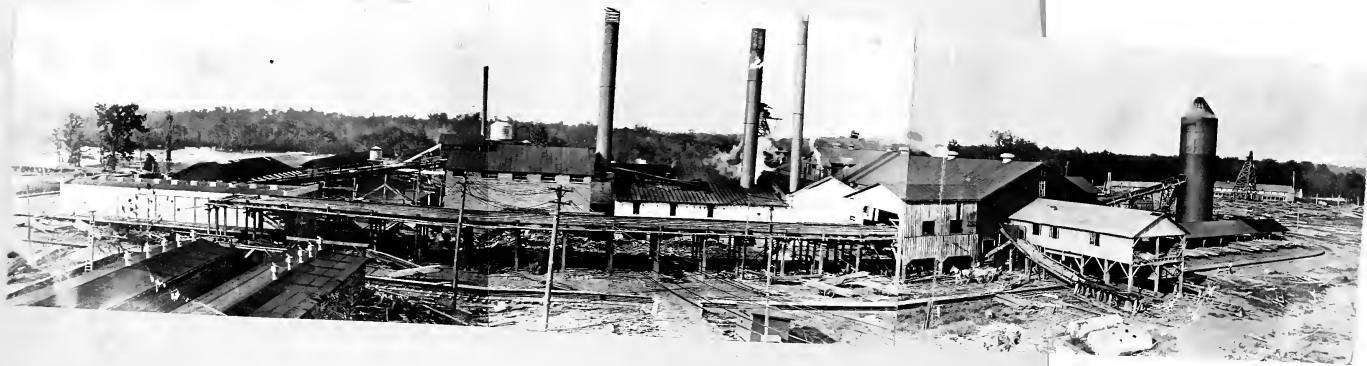


Showing more in detail the mill.









*Showing more in detail the mill.*



— showing the entire plain about the river — the  
lower, lying ground, piece, the river and bounding ground,  
steeped sides, and the river and old ground.

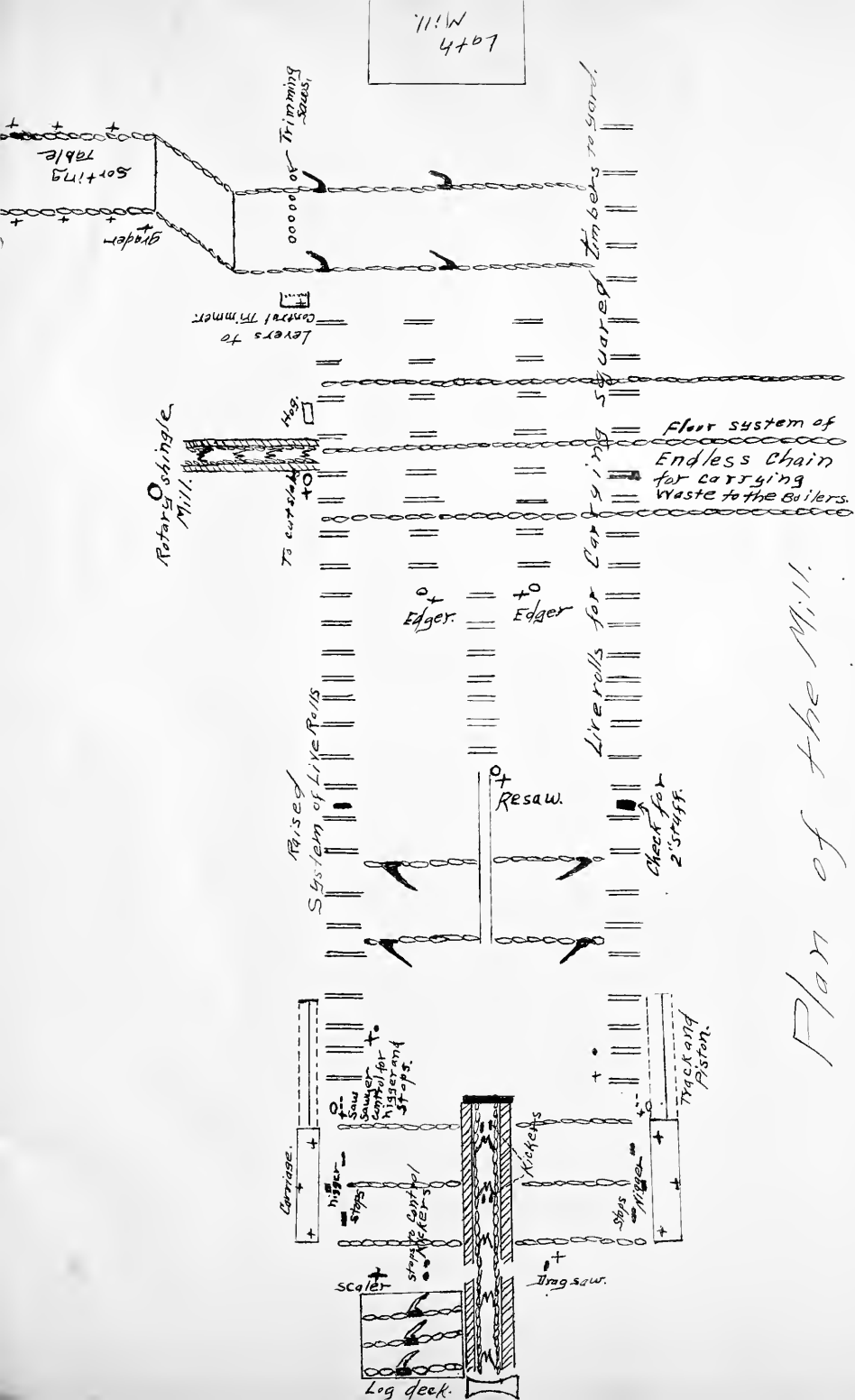




Showing the entire plan about the mill - the  
town, log yard, mill, dry kilns and loading yard,  
storage sheds, and the new and old yard.



711W  
407



Part of the M.H.









REPORT ON THE LUMBER OPERATIONS  
OF  
THE JOHN L. ROPFF LUMBER COMPANY

Submitted by: R. W. Shields  
C. Macfarlane



Through the courtesy of Mr. Millard, President of the John L. Roper Lumber Co., we were permitted to work upon the lumber tracts and in the mills of the Roper Co. in eastern North Carolina during January 1911. We wish to take this opportunity to thank, not only the president of the Company, but every person in authority with whom we came in contact. The courtesy and help afforded us could not have been more sincere and genuine, and added greatly to the pleasure of our trip.

#### INTRODUCTION

The New Bern operation was the one upon which we obtained our data. The mills are situated at New Bern, N. C. and the logging operations are in Onslow County, about forty miles southwest of New Bern. The long railroad haul thus necessitated is under almost ideal conditions owing to the topography. All of eastern North Carolina for a distance inland of from fifty to one hundred miles comes under the physiographic province known as the Coastal Plain. It is surprisingly flat, no where high above tide-water and periodically submerged over large area, forming the swamps or "branches" so typical of all this coast country. The climate of all this district is uniform, the variations in temperature being relatively small. However, the amount of humidity in the atmosphere is very great and this often renders the weather quite unpleasant, especially when cold. On the other hand, the ocean winds, tempered as they are by the gold stream, render many of the days most delightful and bracing.

Few people realize the importance of North Carolina as a lumber producing state. In 1908 it ranked thirteenth while in



1900 it had risen to fourth place. One easily appreciates the position held by the lumber industry throughout the region in question, as almost every town has its mill and in the larger centers lumbering far overbalances any other industry. As regards species loblolly pine (*Pinus taeda*) is probably of first importance while several of the swamp hard-woods are largely cut, especially red gum (*Liquidamber styraciflua*) and black gum (*Nyssa aquatica*). These swamps also yield cypress (*Taxodium distichum*) and white cedar or juniper (*Chamaecyparis thyoides*). The New Bern operation was confined solely to pine, loblolly and a little long leaf.

The pine lumbering operations of the region are under the North Carolina Pine Association, the principal shipping point being Norfolk, Va. Indeed among the larger manufacturers comparatively little lumber is disposed of locally, the entire cut being shipped to the northern market. Eastern North Carolina is traversed by three trunk line railways which, with their many branches, make transportation relatively easy. The rivers of the country, usually deep even when comparatively small streams, are generally navigable, and a large amount of lumber is conveyed from the cutting operations by means of rafts or floats.

This part of the country has been comparatively thickly settled for a long while, and titles, owing to the lands having changed hands often, are badly confused. The surveys are all by meets and bounds and many of them are old and often imperfect. The larger lumber companies have obtained title to great lots of timber lands in "fee simple". These are frequently reserved. The cutting at present is on "time lands" or lands on which the timber right only has been purchased, generally in relatively





small blocks, from private individuals.

The forests of this coastal region present a comparatively large number of definite types, such as pine flats, old field pine, swamp hard woods, cypress swamps, and white cedar swamps. In this report the first two types only will be considered. The pine flats occur on low land which, although not periodically inundated, are much too wet for agriculture. A peculiar property of the land on which this type occurs is the fact that the superficial layer is practically the only solid portion. Once this layer, which is generally from twelve to twenty-four inches in thickness is passed, solid bottom will often not be found for from fifteen to twenty feet. On land of this type it is quite evident that the handling of logs by animals is impossible. The forests are usually even aged and pure, ranging from eight to ten thousand feet per acre, with a comparatively heavy undergrowth of brush and reeds.

The old field pine<sup>type</sup> is explained quite definitely by its name. Much land in this locality is sandy and, after a number of years of cultivation, requires heavy fertilization to produce profitable agricultural crops. Capital for such an operation is frequently lacking and the land is allowed to revert back to forest which, owing to the reproductive qualities of loblolly pine, takes place in a few years. In 1863 when the slaves were freed, cultivation in many of these fields became impossible and much of the timber in eastern North Carolina to-day is about fifty years old as a direct result of the industrial depression during and after the war. These pure stands, less even aged than those on the pine flats are about of the same density but are less obstructed by underbrush making them more easily lumbered.



Loblolly pine is a comparatively inobtrusive species but one of an extremely rapid growth. Illustration No. 1 shows a butt log on which a six inch stick has been fastened. These two characteristics tend to produce trees of a considerable height in a relatively short time, thus producing long, clear, full boles.

In the characteristics which we have just mentioned we have conditions which are almost ideal for conservative forest management. At present, in this locality, forestry is practically not at all or quite involuntary. As the price of stumpage increases and operators realize the future values of their holdings, forestry methods will be very generally applied. We do not feel ourselves fitted to give advice as to the proper method of handling these timber lands but later, in connection with our remarks on methods of cutting and lumbering, we will venture to make a few suggestions.

In the past few pages we have given a hasty sketch of the general lumbering conditions in the region. We will now confine ourselves to the New Bern operation.

#### LOGGING OPERATION.

Comparatively few of the companies' holdings are in large contiguous blocks, and in addition to this, there is much "time timber". The system of logging has been to run a well-constructed, permanent railroad through the district in which the timber lands are located. As the road progresses spurs are thrown out to the side, frequently for a distance of several miles, in order to reach isolated blocks of timber. As the centers of operation move further and further from New Bern, new camps are established. It is the company's intention, as soon as its main line has tapped a sufficiently populous district, to incorporate the road as a common carrier.





# 1. Rapid growth of loblolly pine.



During the first part of January there was a large tract of "old time timber" situated about five miles from the camp known as "Half Moon". It was old field timber about fifty years of age and yielding six to eight thousand feet per acre. According to local inhabitants this land was under cultivation in 1861. Indeed, in walking through the forest, the old furrows are still easily distinguished. In this connection we might mention the peculiar character of the soil all through this neighborhood. Although apparently almost a pure sand, it holds its shape almost indefinitely, the sides of ditches and cuts being perpendicular years after construction.

The tract in question was pure loblolly pine approximately even aged, the trees ranging from eight to eighty inches in diameter and showing almost invariably an excellent rate of growth. The trunks of the trees were long and clear and of little taper, yielding relatively high grade lumber for such small timber. The underbrush was heavy and composed mostly of cat-brier (*Smilax rotundifolia*), laurel (probably *Kalmia angustifolia*) and holly (*Ilex opaca*).

The center of the woods operation is a camp established along the main line of the railroad. More familiar with the camps as constructed in the northern lumber regions, we were surprised at the method employed in North Carolina. The men, instead of living in one or more large bunk houses, bring their families with them into the woods and each has a house or cabin. This is true even of the negroes which comprise the principal element of unskilled labor. The boys "batch it", three or four in a cabin doing their own cooking. Although the company owns all of the buildings in camp, the only ones over which they have any supervision are the





commissary and a boarding-house. The boarding-house is for the soda brokers, sightseers, fishermen, etc., and affords an opportunity for entertaining visitors. While we were there the camp was shifted and it was our good fortune to observe not only the two camps, but the method of moving camps. A more striking comparison between a well and a poorly regulated camp would be difficult to find. "Half Moon", the camp occupied when we arrived had been used for a number of years. It is a little difficult to appreciate why the camp was located under such unfavorable conditions. Situated as it was on the very edge of "pocoson" and elevated very little above it, it was almost continually wet, which condition was intensified by the heavy clay character of the soil which prevented absorption. It was impossible to obtain good water and in general the location was extremely unhealthy. Here also there was no distinction between the white and colored portions of the camp. The commissary was at the extreme edge of camp and as far as possible from the boarding-house. Also the houses were hardly better than shacks, many of them of but two rooms. Such houses as this, although quite ample for a single man, were not proper provision for a man with a family.

The new camp "Camp Perry", was a very pleasant contrast to "Half Moon". Situated on a high, sandy knoll, it afforded excellent drainage and much better water conditions. Since it is intended to occupy this camp for nine or ten years, the Company has deemed it advisable to spend a considerable sum on this construction. The camp is divided into definite halves, the white and the colored, the commissary being placed between the two settlements. The houses for the families are four room, one story buildings, well constructed, sealed and each fitted with a piazza. The houses are built of finished lumber costing seventeen dollars



per M. The cost of a complete house is approximately three hundred dollars. The commissary, although not completed while we were there, promises to be a building of considerable size, affording much better facilities than the old shack which bore the name. The old camp was more or less rambling, extending over considerable ground. "Camp Perry", on the contrary, is stretched out on a long double line along the railroad. Such a plan has many advantages, particularly so in facilitating the moving of buildings when camp is shifted. Many of the smaller shacks for the single men were conveyed bodily from "Half Moon" to "Camp Perry". This was done by the skidder which dragged the houses up skids on the flat cars. When a number of cars were so loaded a train was made up and the whole affair taken to the new camp site. In unloading, skids were run from the cars to the new foundations and a cable was passed around a tail tree and through a block locked to the ties. By means of this apparatus the logging locomotive simply dragged the houses from the car to its foundation.

The management of the commissary, an important part of any lumbering operation, is to be commended. While a legitimate profit is attempted, robbery, as practiced by many companies, is not indulged in. An unprincipled management of the commissary department can hardly be condemned too strongly. On the other hand, proper management shows a decided attempt at right dealing, since the temptation for extortion, where no competition exists is very strong. The system of purchase is by cash or labor checks, no credit being allowed. These checks or "plucks" are issued by the paymaster<sup>a</sup> for amounts varying from fifty cents to two dollars and a half to any man who has money coming.

In one respect we feel at liberty to criticize the organiza-



tion at "Camp Perry". That provisions are intended for the future we cannot say, but, so far as we have been able to observe, proper sanitary requirements were not complied with. In any permanent camp the mere construction of cut-houses is rarely sufficient, definite laws requiring their use being necessary. With the labor element composed so largely of negroes this is doubly important. With the exception of the married quarters we were able to observe no cut-house facilities and conditions existed which were certainly not sanitary.

In another particular also "Camp Perry" differed from the camps in most other logging operations, in that there was no resident doctor. In most camps some system of co-operation between the company and the men is effected by which the salary of a camp physician is paid. A company is assuming a dangerous responsibility in placing a large camp of men (one hundred or over) where no medical aid may be obtained. This is especially true in a business as dangerous as logging and in a neighborhood where malaria fevers are as prevalent as in eastern North Carolina.

Planning the woods operation in this district differs from that in most localities. As we have said the timber is rarely in large blocks. Before purchase the tracts are cruised to obtain the stand and these purchase estimates are usually used in the logging operation. From all we were able to hear, ocular estimates alone were used and in stands as regular as most of these pine forests the ocular estimates by an experienced man should be comparatively accurate. Therefore, in planning an operation, the woods boss goes into the tract, stakes out the general route of the logging railroad and estimates the time required and the probable yield. All of this must be done and the railroad constructed before the preceeding



tract is finished as a tie-up of over a few days, and a notice is sent to the Company in the shutting down of the mill.

The construction of the new branch line of the railway is an important item of cost in the lumbering operation. After the general location of the line by the wood boss the work is done by the track gang. This gang is composed of a foreman, fifteen to twenty negroes, an engine and crew, and tool car. They will lay about three hundred yards of track per day at an original cost of about twelve hundred and seventy dollars per mile using twenty-five pound rails, the labor item alone amounting to approximately thirty dollars per day. Most spurs, however, are laid with rails and ties taken up from an abandoned spur in which case the cost of construction should not exceed three hundred dollars per mile.

As soon as the railroad into the new tract is in operation the stalls for the teams are established. As used in the New Bern operation, this consisted simply in a corral fitted with feed and water troughs, a portion of which was covered with canvas. This method of stabling the animals we are inclined to consider a short sighted policy since it is virtually impossible to keep even mules in good condition if they are exposed to cold winds and rain. On the other hand, better facilities would be extremely expensive owing to the short time that any one site is occupied. On this operation forty-five head were kept in the stable, the total number not being in continuous use. For this number of stock the feed consisted of four bales of hay and thirty bushels of oats with occasional <sup>messes</sup> of corn and cotton seed meal. The average cost of keeping a horse in the woods was about fifty cents per day.

The spur roads having been established, the logging of





any definite tract may be divided roughly into three operations: cutting, skidding and loading with the subsequent necessary railroad transportation. We will take these up in the order given and attempt to outline the general procedure.

The cutting crews are composed of two men, all of the felling being by sawing with the exception of the under-cut. A novel feature of this operation is the fact that the company supplies wedges for the fellers. We were told that one man was constantly employed making these wedges. They are made of dry hickory and seem to be extremely serviceable. Unfortunately we were unable to obtain a definite figure of cost. Loblolly pine is peculiar in its branching habit, the top being small and containing very little merchantable material. Owing to this fact, swamping, or trimming is hardly ever necessary. For this reason a cutting crew of two men as an economic unit is possible. A cutting crew cuts from five thousand to seven thousand feet per day depending on the timber. This amount would be equal to about one hundred sixteen-foot logs. The system of paying, contrary to that practiced in any other locality with which we are familiar, is by the piece, a crew receiving three cents for each sixteen foot log. By this system of cutting a man will make from a dollar twenty-five to a dollar seventy-five per day and the cost to the Company will be forty to sixty cents per thousand, Doyle Rule. This system of paying, although universal throughout the region, has a serious drawback as it encourages the cutting of small logs. When paid by the piece the men will leave the larger trees whenever possible. On the other hand, when paid by scale, the larger logs give the larger returns to the cutter. In laying out the day's operation,



the woods foreman allots a district to each crew. The work is planned so that the cutting is begun as far as possible from the railroad, trees being felled away from the track. In this way, skidding the logs around the tops is to a great extent avoided. Each crew is numbered and, as a tree is felled, the number of the crew is marked on the stump. The stumps being numbered and the cutting crews working each on a distinct area, the woods foreman, by simply walking over the cutting, counting the logs and checking off the stumps, can tell the work done each day by the crew. On this operation the Company is attempting to enforce conservative cutting. No tree was taken which did not yield a sixteen foot log eighteen inches at the small diameter or which amounted to a stump diameter limit of about twelve inches. Stump height was also considered and an attempt made to let no stump exceed eighteen inches.

On this operation skidding is divided into two parts. The logs are first snaked from the stump to the roads and are then conveyed to the roll-ways by two-sheeled carts. The snaking crew consists of a driver, team, and swamper. The distance snaked is never great, usually less than one hundred feet. The carts used in skidding are of two distinct kinds. In the smaller, which might be called the native cart of the region, the tongs are simply fastened into one end of the log, the forward movement being sufficient to raise this end slightly from the ground. Illustration No. 2 fails to show this perfectly as the team was not in motion. The larger carts were recently introduced in Louisiana. They consist of two ten-foot wheels through the axle of which there is a very long sliding tongue. On this axle there is also a drum from





# 2. Low wheeled cart used in skidding.



which projects a vertical beam of iron over the tongue. When the tongue is loaded logs from the beam could touch the ground. As the team goes ahead the vertical beam turns the drum forward, thus raising the tongs and the logs from the ground. On this cart the logs are grabbed near the middle point and four logs may be carried at one trip. The team consist of four mules, the driver riding the near pole animal. Illustrations numbers three and four show this rig in two different positions. Although this cart is not popular among the local lumbermen, it has very evident points of advantage. This is especially true in soft ground where large logs are to be handled.

The roll-ways, or places where the logs are stored previous to loading are situated on both sides of the track, a space about fifty yards in width being entirely cleared on each side. Long skids are placed at right angles to the track and are of sufficient length to hold from twenty to thirty logs, the average number loaded on a car. The carts are simply driven over the skids and the logs unhooked, two men rolling them into place. We were unable to obtain the cost of the skidding operation and believe that this cost has not been definitely computed. Illustration No. 5 shows a section of the track with the roll-ways beyond.

Throughout the operation all the cars were loaded by steam, two machines of different types being used. The larger and by far the better machine, the "McGiffert," has a daily capacity of ninety to one hundred thousand feet. The "Parker", a small inferior machine of local construction has a maximum capacity of from sixty to seventy thousand feet. The "McGiffert" loader, manufactured by the Clyde Iron Works of Duluth, Minn., is a self-propelling machine. Illustration No. 6 shows the machine with the wheels raised to permit







# 3. High wheel cart loaded.



# 4.. High wheel cart empty.





# 5. Track with rollways beyond.



# 6. McGiffert loader.



the empty cars to pass under. A car has been loaded at the empty roll-way on the left of the picture. The wheels are lowered on the rails thus raising the shoes from the ties and the machine moves back so that the end of the boom is over the middle of the roll-way. The wheels are again raised permitting the shoes to rest on the end of the ties and allowing the empty car to pass under. The car is drawn in position by a "spotting line" from the end of the machine. The "McGiffert" is a fixed or stationary boom or machine. The system of loading is by end grabs from a bridle on the hoisting cable. A blue print of these grabs is shown. Two men place these grabs on the ends of the logs, holding onto the grab ropes. When the strain is applied the grabs sink into the logs up to the shoulder. This distance, however, is not so great that a short pull on the grab rope will not release them, thus allowing a log to be dropped wherever desired on the car. The proper operation of this machine requires a crew of six men: engineer, fireman, wood-chopper, top-loader and two men on the drag ropes. The time required to load a car of twenty-five hundred to three thousand feet, move the machine back to the next roll-way and spot another car ready to be loaded is about twenty minutes.

The "Parker" loader is a stationary machine raised upon jacks to a height that will allow empty cars to pass under. This is a movable boom machine and its stationary character makes it necessary for the logs to be skidded up within reach of the cable. Illustration No. 7 shows one of these machines in operation, an empty car being spotted. The crew required is the same as the "McGiffert" with practically the same duties. Costs of the loading operation were not kept separate and we therefore were unable to make better than an approximation. The total cost of sawing, skidding



*End Grabs used on  
McGriffert Loader.*



*Half Size*







# 7. Parker loader.



and loading amounted to two eighty to two ninety per cent.

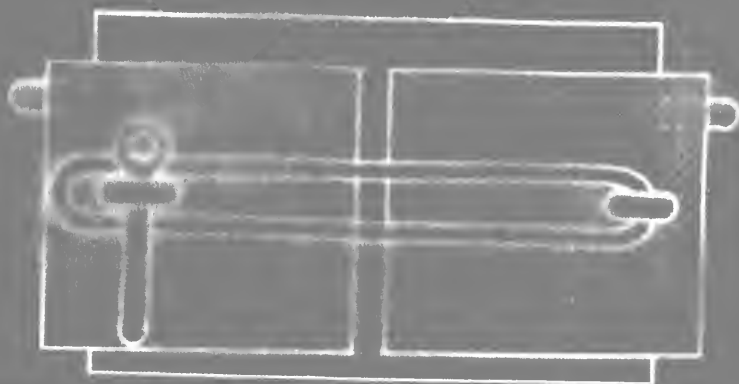
The cars used on this operation are the regular ones used for sixteen foot logs. Top loading and chaining were not attempted, the logs being simply piled above the stakes. The device by which the stakes were held in place is worthy of mention. A blue print is given showing its construction. By simply knocking out the pin the stake is released and half of the log may be unloaded without any labor. Illustration No. 8 shows a loaded train along the roll-way.

The uneven size of the timber rendered clear cutting impracticable and, as a result, a considerable part of the stand is left. From photograph No. 9 the remaining portion is shown on a narrow strip between a railroad and an open field. It gives a good idea of the appearance of the culled forest. In a rough way this is an application of the selection system of forest management in that it provides for a future crop of timber. In addition to the timber already standing the opening of the forest increases the amount of light sufficiently to encourage reproduction. In loblolly pine this means a new stand of merchantable timber from fifty to sixty years, provided it is not destroyed by fire. Indeed brush disposal as a means of fire protection is the principle criticism we would attempt on this operation. If the tops and brush could have been piled and burned as the operation proceeded it would have been comparatively inexpensive and would have greatly safeguarded the future stand. Judging from comparative costs on the national forests in the west, where, with high labor, the cost of brush disposal is frequently kept below forty cents per M, in this region the cost should not exceed twenty-five cents per M.B.M.



METHOD  
— OF —  
Fastening Standards  
— on —  
LOG CARS

Half Size







# 8. Loaded log train.



# 9. Cut over area.





As the empty cars are loaded in the woods, small locomotives take them to the head of the main line, making them up into trains. This, together with getting the men to and from work, requires the constant service of three engines. The train from New Bern usually arrives in camp about noon, picks up the loaded train already made up and leaves for town at one or two o'clock in the afternoon. The run of forty to fifty miles usually requires from two to three hours. The train is side-tracked just out of the mill yard and the engine removes the empties from the log yard. The loaded train is then run into the log yard ready for the morning.

#### MILL OPERATION

At present a large yard is used for storing the logs before they go into the mill although plans are being made for the construction of a mill-pond for this purpose. Picture No. 10 taken from the log-deck shows this log with the log jack extending through the middle of it. When the loaded cars are brought into the yard they are placed on tracks parallel to the log-jack. When the standards are removed about the half the load rolls from the cars onto the skids extending from the tracks to the jack. Two men with cant-hooks roll the logs up to the jacks and also unload the logs remaining on the cars. Several cars are unloaded at one time. One man, working along the different skid-ways tumbles the logs into the jack. A crew of seven men, three unloading crews and the man just mentioned, are able to keep the mill fully stocked. As the logs are taken up on the jack they pass under a spray consisting of twelve half inch pipe, the ends of which have been somewhat flattened. This washing serves the double purpose of removing sand and grit from the surface of the log and of wetting the bark, thus decreasing the amount of dust in the mill. As the logs reach the head of the jack the man





# 10. Log yard.



who controls the "kickers" scales them carefully, keeping accurately for the two saws. While we were in New Bern all the logs were brought into the mill in sixteen foot lengths but a cut-off saw was being installed by means of which thirty-two foot logs could be cut into two pieces.

We will not attempt to describe in detail the saw mill. The mill is of the usual double band type, both saws being double cut. The maximum capacity is about 160 M. feet per day; the daily cut however would not exceed 120 M. The same slasher and cut-off saw served for both band saws. Whenever possible, two inch planks are sawed and these ripped in the re-saw. The one inch board from the main bank saw as well as from the re-saw are taken care of by the same edger. It will be seen that the mill is practically of double construction until the edge boards are ready to be trimmed to standard length. After the slabs and edgings are passed through the slasher they are conveyed on an endless belt to the "hog". Four men stand along this conveyer and pick out pieces suitable for lath or "copper stickes". Seven men are employed in the lath mill proper and they manufacture 18,000 to 20,000 lath per day at an average cost of two dollars and five cents per thousand. "Copper stickes" are small clear pieces, 18"x 7/8" x 13/16", and are used in the refining of copper. It is necessary that these stickes should be very exact in size. Seven to nine thousand are made per day in the New Bern mill, this number includes the copper stick output of the planing mill.

As the boards drop from the trimmer, they fall onto a conveyor which carries them over to the shed of the dry kilns. As they enter these sheds they fall onto a table which is paralleled by a number of deep channels under which are live rolls. The



boards are here roughly graded according to length and width. These channels are of different lengths, each one running out opposite the entrance to one of the kilns. The trucks upon which the lumber is dried can thus be loaded with a fairly uniform grade. The dry kilns are ten in number 18' x 100', and each one is capable of holding fifteen trucks or cars. Proper drying requires about seventy-two hours, lumber being put in green at one end and taken out dry at the other. The kilns will hold one hundred and fifty trucks with an average capacity of twenty-five hundred feet which means a total capacity of three hundred seventy-five thousand board feet. The accounts, as kept in this mill, group the cost of sawing and drying as one item, averaging two dollars and twenty cents per thousand.

As the trucks come out of the kilns, they are run onto transfer cars and taken to the planing mill. This mill is a long, one story building, five hundred twenty by one hundred feet. All the machines are electrically driven by individual motors, the power coming from the central power house. In addition to this a system of vacuum dust conveyors sucks up all shavings and saw dust and conveys them to the boiler house. Although this building is called a planing mill there are in reality several operations carried on within it. As the boards come from the kilns they are either planed at once or are ripped up into narrower widths, thus improving the grade. These narrower boards are then taken to the planers and the edgings from them are made into mouldings or "copper sticks". At the lower end of the mill are placed planers, moulding machines, and re-saws. There are three moulders, seven planers, and three re-saws. Photograph No. 11 shows part of the battery of planers and part of the sorting table. A similar table







# 11. Planers and sorting table.



# 12. Sorting table and carts.



showing the carts in position is shown in picture No. 12. In this part of the mill there are several ingenious methods of saving time. For instance, a board is planed on both sides to  $7/8$  inches, and ripped up on a re-saw, and the result is two pieces of  $5/16$  inch ceiling. After the boards have left the planer they are carried down on the grading table, passing in front of the grader who marks each board. At the lower end of this table are men with carts, each one loading a special grade. The planers and moulders occupy but one side of the building. The other side is devoted to the storing of unplanned lumber and is capable of housing 250,000 to 300,000 board feet. Down the center of this building there is a broad passage-way for the transfer of lumber.

The planing mill is a one storied building with a high gabled roof. At the ends are rooms or cages, one for the saw filing and the other for dressing the planing and moulding tools. These rooms are fitted up with all the machinery for their respective purposes. All of the saw filing for the planing mill is done by one man. The band saws are all machine filed but the circular saws must be done by hand. Picture No. 13, although not taken in this building, shows one of these saw filing machines. A similar room and equipment is situated directly above the main saws in the saw mill.

Contrary to the ordinary custom of northern mills, at the New Bern plant no lumber was stored in the mill yards. Beside the storage room already mentioned in the planing mill, there are three separate sheds Nos. 1, 2 and 3, with a respective capacity of 2,000,000, 500,000, and 200,000 feet. It is not the intention of the Company to keep a very large stock on hand, enough only being kept to fill small orders or to complete delayed shipments.



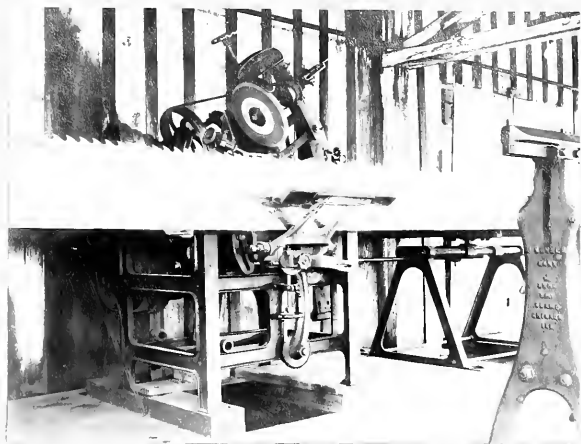
Picture No. 14 is a view of the boiler house.

Power for the entire plant is generated in the boiler house. The boiler is placed in the basement of the boiler house. In all lumber mills, the fuel used is chips, shavings and saw dust, they being carried directly to the second floor of the boiler house by means of conveyors. By using high stacks and allowing the fuel to enter <sup>at</sup> the top of the fire-box, complete combustion is obtained without the use of blowers. The boilers furnish steam for the dry kilns as well as for the mills and engine. When running full there is a surplus of waste material. This dumped into the burner, a great steel tower nearly one hundred feet high. Even here the fuel is not entirely wasted, the burner being water jacketed and hot water for the boilers being obtained from this source. As will be seen from the accompanying diagram of the plant, the boiler and engine houses are separate buildings. The latter is so placed that direct drive from the saw mill is possible. Beside the five hundred horse power engine which alone drives the saw mill, an equal amount of power is necessary to generate the electricity used in the many machines in the planing mill.

In order to obtain reasonable insurance rates it is necessary suitable fire fighting apparatus. In the New Bern plant this consists of two large pumps which draw their water from the river directly. Some <sup>idea</sup> of their power is conveyed by the fact that, when cut in, they can easily back up the pressure of the city mains. Even with such excellent fire fighting equipment and the buildings so well distributed, the insurance rate is one and one-half cents on the dollar which, on a plant valued at three hundred thousand dollars is a very considerable item.

It might easily be inferred that the New Bern plant was





# 13. Saw filing machine.



# 14. Interior of storing shed.





the only one owned by the John L. Roper Lumber Co. Such is far from the case, but, of the many plants operated by this concern, it is the largest and newest. In the following pages will be found tabulations of the different costs of logging and manufacture. Within the last year there has been a decided change in the logging division of the Company, especially at New Bern, newer methods and more up-to-date machinery having been installed. A comparison of the figures headed "logging costs" shows very clearly the changes thus brought about for the years 1909 and 1910. This same introduction of modern methods will lead to greater itemizing of the costs.

# LOGGING EXPENSES.

July 1910

Pine Logging	Total	per M. ft. out trans.		Comparison of costs for months of	
	\$			1909	1910
Sawing, skidding, team- ing, loading, etc.	\$ 5734.03	\$2.97			
Railroad operation	3087.06	1.56	1.56		
Freight paid other roads	370.18	.19	.19		
Tug & barge expense	98.59	.05		\$6.18	\$4.71
Total	9269.86	4.71			



LOGGING EXPENSES. (CONT'D)

August 1910

Pine Logging	Total	per M ft. cut	trans.	Comparison of costs for months of 1909 and 1910	
Sawing, skidding, team- ing, loading, etc.	\$5454.50	\$3.09		1909	1910
Railroad operation	3317.68	1.88	\$1.71	\$3.92	\$5.40
Freight paid other roads	5557.17	.53	.29		
Tug & barge expense	189.41	.11			
Total	9513.56	5.40			

October 1910

Sawing, skidding, team- ing, loading, etc.	\$6253.93	\$2.86			
Railroad operation	4075.36	1.87	\$1.87	5.07	4.85
Freight paid other roads	211.17	.10	.10		
Tug & barge expense	45.07	.02			
Total	10583.85	4.85			

November 1910

Sawing, skidding, team- ing, loading, etc.	\$5226.55	\$2.59			
Railroad operation	3651.48	1.67	1.67	6.28	4.16
Freight paid other roads	218.76	.10	.10		
Total	9096.79	4.16			

In the above tables items marked "sawing, skidding, teaming, etc." include all costs incidental to placing logs on the cars, including maintenance of teams, feed, labor, etc.

"Railroad operation" includes the movement of logs from camp to



mill, maintenance of track gang, railroad supplies, etc.

"Freight paid other roads" includes transportation charges for all camp supplies, men and animals, and everything not included under "railroad operation".

"Other expenses", which item does not appear in table, includes insurance, salaries of watchmen, incidentals and "fixed charges", the latter being payment of interest on investment.

#### SAW MILL EXPENSES

	Output in B.M.	Pay rolls Totals	Other Expenses* per M	Totals per M	Totals Amount	per M
July	2,513,160	\$4374.32	\$1.74	\$1059.88	\$4344.20	\$2.16
Aug.	2,454,980	4328.27	1.72	1185.13	5413.43	2.20
Oct.	2,523,260	4578.72	1.74	1067.57	5446.35	2.16
Nov.	2,555,660	4424.25	1.73	1470.04	5894.29	2.31

#### PLANING MILL EXPENSES

July	2,304,299	4717.13	2.00	852.67	.36	5570.00	2.36
Aug.	2,623,617	5253.94	2.00	658.24	.25	5912.18	2.25
Oct.	2,795,057	4437.55	1.59	992.36	.36	5429.81	1.95
Nov.	2,675,252	4366.19	1.65	994.37	.37	5360.56	2.00

\* See foregoing note on this page.

#### OUTPUT

	Logs sawn	Log Ft.	Ft. per log	B.F.	% over- run.	Hrs. mill operated
July	25,754	2,125,493	83	2,513,160	18.2	225
Aug.	33,157	2,027,420	61	2,454,980	21.1	241
Oct.	27,201	2,181,338	80	2,523,260	15.6	228
Nov.	30,652	2,265,647	74	2,555,660	13.	317



CONCLUSION

We have attempted in this report to take up the successive steps in the manufacture of lumber. Certain operations may seem to have been unduly emphasized while others are certainly lacking in detail. We do not consider this as a fault because it is the unusual features only of the work upon which we have laid stress. Certain parts of every lumber operation are almost identical and we have no intention of boring lumbermen with such repetition. We hope that we have in some degree accomplished our object and wish to again express our appreciation of the courtesies extended to us.







North Carolina cypress swamp.



Cutting crew.



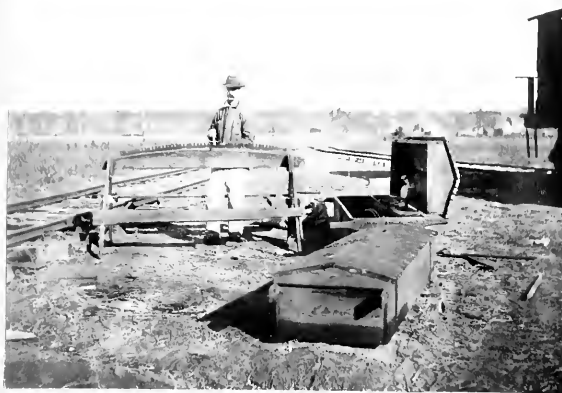


Typical black gum swamps in Eastern North Carolina.





Band re-saw at Roper North Carolina.



Saw filer on woods operation, NewBern, N. C.





Two views of the NewBerm mill.

















A000061785717

